Model Engineer

THE MAGAZINE FOR THE MECHANICALLY MINDED

ONE SHILLING 19 SEPTEMBER 1957 VOL 117 NO 2939

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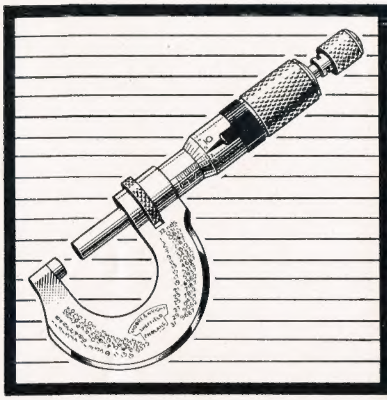

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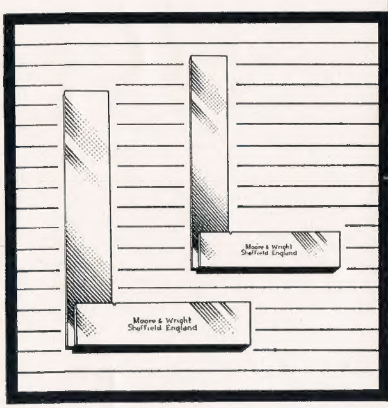

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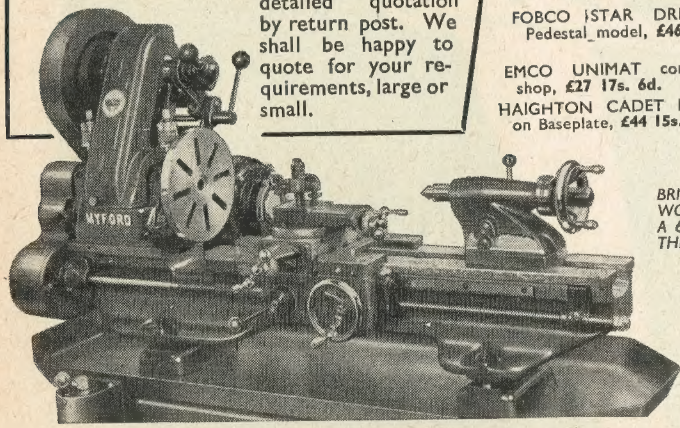

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Model Engineer

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Smoke Rings

A WEEKLY COMMENTARY BY VULCAN

THOMAS B. GLOVER is a well-known name, particularly to thousands of men of the 14th Army in India during the last war, when the owner of the name was Inspector of Factories to the Government of Bengal.

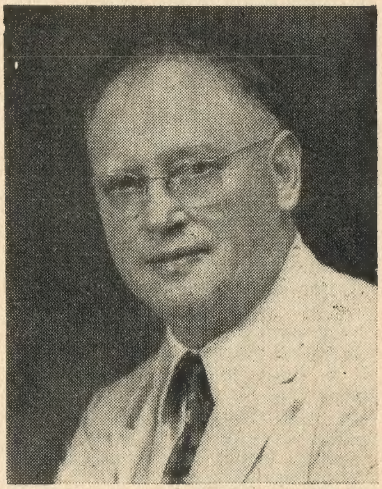
At that time he had a well-found home workshop, and a continuous $3\frac{1}{2}$ in. gauge track in the garden. He also had the LBSC-designed Atlantic *Maisie*, which with frequent changes of drivers was often in steam for six days a week.

His home became a focal point and a "leave centre" for model engineers of all ranks, resulting in the formation of the East India Society of Model Engineers, with a correspondence and visiting membership extending throughout India. Many models, since completed in England, started life in that workshop in Barrackpore !

Now aged 58, Mr Glover started his working career as an apprentice in general engineering in Nottingham, in conjunction with afternoon and evening study at the University College there. His first love, he says, was the beam engine (built in 1824) which ran the machine shop in which he worked.

First-class certificate

He served as engineer in the "City" Line and, after obtaining his first-class Board of Trade Certificate, became assistant works engineer and



Thomas B. Glover

then mechanical draughtsman to the Calcutta Port Commission.

On his return to Nottingham he became a Safety Engineer in the contract world in Britain. Incidentally most of his workshop came home with him !

The model engineering side of Mr Glover's life commenced at the tender age of nine, when he built a steam turbine from a treacle tin, with two soldered-on struts carrying a knitting-needle on which was mounted the rotor, cut from a tin lid.

He had a treadle lathe at 14, but subsequently having no settled home

Smoke Rings . . .

the hobby had to be "in suspense" for nearly 20 years. Then came a "semi-portable" workshop which was described in ME a year or two before the war.

Raised £465 for charity

During the war, among his many other activities, he built a steam yacht which, raffled for funds for a Seaman's Home, raised the sum of £465, as mentioned in Percival Marshall's *Mechanics in Miniature*.

In 1949 Mr Glover started building an Indian State Railways Baltic, but he does not expect to complete this until 1959. This delay is largely due to his official duties which take him all over Britain, and he is also secretary to the Nottingham SMEE, a post which occupies much time that he would prefer to spend in finishing the Baltic !

However, the engine did run for the first time at the official opening of the club's new track at Valley Road, an account of which appears on pages 418/9 in this issue.

Badges

SOME of us have, as souvenirs of the Russian visit, one or two of the neat little badges which Alexander Bliznakov and his friends thoughtfully brought with them. They were themselves wearing a tiny badge proclaiming, to all who knew what it signified, that they were ship modellers.

Would a similar national mark of identification, as distinct from the familiar club badges, be popular in Britain ? This question was discussed at the conference on the last day of the Model Engineer Exhibition when R. S. Page, secretary of the South Wales and Monmouthshire Federation, said that the federation was willing to offer a prize if MODEL ENGINEER would hold a competition for the best design.

Competition

Such a competition was organised by MODEL ENGINEER a very long time ago, and the result was a badge which many modellers, here and there, still possess. The emblem bore some resemblance to the one on the present Exhibition badge except that the cog was not accompanied by a hand.

One type was made for the watch-chain and another for the lapel. William Evans, who is leaving the Percival Marshall Group after 56 years, recalls that the demand dwindled after the first rush and was not sufficient to justify a re-issue. The badges were sold from this office for a shilling, 1s. 1½d. post free.

These are the facts. They need to be considered carefully. Badges are much cheaper when ordered in very large quantities but before ordering thousands of them it would be necessary to make sure of the demand. All too often enthusiasm is not sustained when proposal becomes fact. But what do readers think ?

Sporting chance

Rates were also discussed at the same conference but nothing of importance emerged that is not already familiar to our readers except that S. L. Sheppard, secretary of SMEE (11 Portland Place, London, W1), said that his society was willing to help by keeping the other societies informed of its own progress.

Remember the rates article which asked where a good kind lawyer could be found ? SMEE has, it seems, discovered him. He appears to be inclined to think (one must never go further than that with a man of law) that SMEE has a sporting chance.

Presumably this would apply to the other societies as well. At any rate they will follow the rating fortunes of SMEE with interest, knowing that these fortunes may reflect their own.

The suggestion of raising a fighting fund, I am told, did not meet with a very enthusiastic response. One delegate remarked that the cost would equal about a century's increase in rates !

Word of appreciation

The conference expressed and recorded its appreciation of the services rendered to model engineering by J. N. Maskelyne, Edgar T. Westbury and LBSC (who is going to hear more about it !).

There was an especially warm welcome from chairman D. H. Jennings for a visitor who announced himself as "Donelly of the Rand SME." One member of the Rand Society, after leaving Johannesburg for Bloemfontein, has founded a new society in that town as well.

Everywhere in the Commonwealth, as in the United States, the model engineering movement seems to be prospering, and in the near future MODEL ENGINEER will take a look at some more of these vigorous overseas societies.

Those simple errors

HOW often a really good model is spoiled by some simple and usually inexplicable error ! Particularly does this apply to locomotives in which the workmanship and finish, in themselves, are well-nigh perfect, indicating that the errors are not concerned with any difficulty of construction; rather, they point to a lack of detailed knowledge.

For example, a very common error is found in the painting of wheels, when spokes, bosses and tyres are all one colour. This is not correct, except when the wheels are painted black. In every other case that I can think of, except one, no matter what colour the wheels are painted, the tyres are *black*.

The exception to this rule is to be found in the very few steam locomotives that are still in use on the Metropolitan line of London Transport. When these locomotives have been repainted in recent years, the wheels have been given a uniform coat of colour all over, and the effect is not too good.

In some isolated cases, locomotives have been turned out with tyres left unpainted, but given a semi-polished machine-finish, in which the effect is ornate and somewhat flamboyant; but it is better than when the tyres are the wrong colour.

Outside cranks

Another quite common error occurs in the case of double-framed engines with outside cranks; too often, model makers go to the trouble of polishing them. This is quite wrong, except in a few cases of engines elaborately finished and decorated in the days before 1860.

Certainly after that date, outside cranks were invariably painted, often the same main colour as the rest of the engine, or the same colour as the outside frames; and they were usually lined out in the same general style as the frames.

In a few instances, such as the Kirtley double-framed engines on the Midland Railway, outside cranks were painted vermilion; they were never polished, and there was no reason why they should be, as early engineers discovered in time. Presumably, in their day, they were influenced by marine practice; but in that the conditions were very different.

Cover picture

Mr J. Given, of Sunningdale, Berks, built this handsome free-lance cathedral from sheets of Perspex, using a sharpened screw-driver and a bradawl as carving and scribing implements. Figures of the angels, and other fine detail work, were done with a smaller sharpened screwdriver.

AT THE ME EXHIBITION

A review of the LOCOMOTIVES

By J. N. Maskelyne

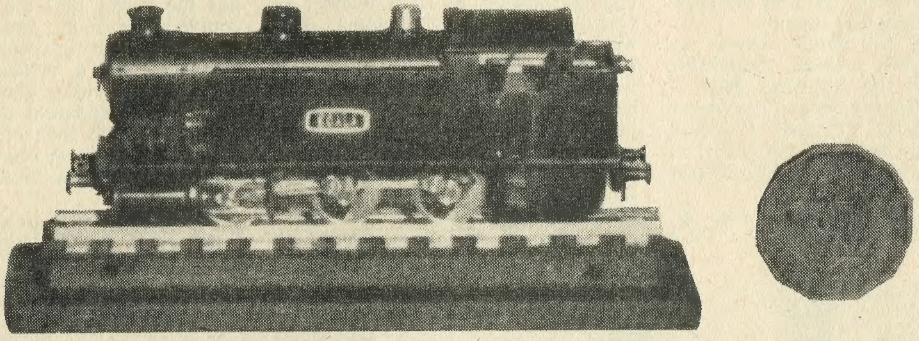
A REMARKABLE feature of the locomotives entered for the Competition this year was the number that had put in some years of work before being exhibited. This suggests that competitors are at last beginning to realise that their models need not necessarily be brand new in order to gain awards.

In fact, evidence that a locomotive has done some running is usually a "feather in its cap," so to speak, during judging in the ME Exhibition. The judges then look for signs of wear in the working parts; and the extent of the wear tells its own story about workmanship !

It may be said straight away that, so far as this year's locomotive exhibits are concerned, those which had been working had stood up to it very well; the amount of discernible wear of the working parts was no more than might be reasonably expected, and that speaks well for the original quality of the workmanship.

There have been occasions in the past when the ME Exhibition has contained what has been claimed to be "the smallest steam locomotive ever made," or something to that effect. I do not think I have ever seen one smaller than A. A. Sherwood's 2 mm. scale, 9½ mm. gauge 0-6-0 tank engine exhibited this year. Although it is of freelance design, it is a little gem in many ways.

It is very well made, is beautifully proportioned and is far from being a freak in appearance. It had come all the way from Australia.



Built by A. A. Sherwood, of Australia, this is the smallest working steam locomotive in the world

Only 2.8 in. long, 0.75 in. wide and 1.1 in. high, it has *two* cylinders, 0.125 in. dia. and 0.18 in. stroke. The boiler is 0.42 in. dia. and 2 in. long, probably the smallest working boiler that has yet been made.

And now I must get down to the Competition entries, and the first to notice is the very fine 5 in. gauge Lancashire and Yorkshire Aspinall 0-6-0 by L. R. Raper, of Manchester, winner of the Championship Cup. This is certainly one of the very best 5 in. gauge locomotives that I have ever seen, and is exactly the sort of model that pleases me.

It is so beautifully accurate in every detail, inside and outside, with almost all its components carefully reproduced from the official prototype drawings. The external finish is just a trifle on the dull side, and would probably be improved by a carefully sprayed coat of varnish. And ought not the nuts on the coupling-rod pins be fitted with split cotters, or tapered pins ? These are visible in a large engraving I have of one of the prototype engines.

Apart from these minor faults, however, the model is about as perfect as it could be and well merits the Cup and a Silver Medal. I felt, too, that it deserved the Crebbin Memorial Cup, for I cannot conceive a model that would have given greater delight to Mr Crebbin.

Another Silver Medal winner was the 3½ in. gauge SR Schools type locomotive by R. P. Holdstock, of St Leonards-on-Sea. It is not an exact-scale model, but it comes very near to being so. Its most apparent fault is that, in a three-cylinder engine, the counterweights in the four coupled wheels would not be either the size or in the positions that they are on this fine job.

This is not the fault of Mr Holdstock but of the commercial castings he used; but I suggest the effect would be greatly mitigated by covering the existing driving-wheel weights by crescent-shaped pieces of plate deep enough to hide the cast-in weights

and long enough to bridge two more spokes to the rearward of the crank centre-line, leaving all else as it is. It would not be strictly accurate, but it would make the fault far less apparent than it is.

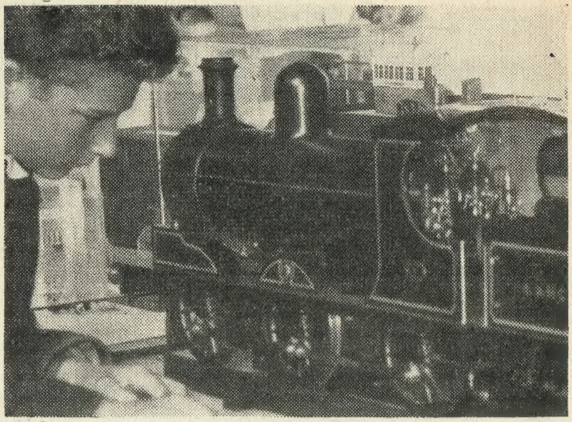
A Bronze Medal was awarded to F. F. Few, of Hatfield, for his really delightful $3\frac{1}{2}$ in. gauge version of the famous old Liverpool and Manchester Railway engine *Lion* (alias *Titfield Thunderbolt*). This was a very fine piece of work, with every nut and rivet of the original carefully reproduced.

It was built to drawings obtained from British Railways, and it certainly has the air of authenticity all over it, combined with first-class workmanship. One of its most striking features is the wooden, slatted lagging on the boiler barrel and firebox sides, all very neatly and accurately done, and not spoiled by an overdose of varnish !

A VHC diploma was awarded to a $3\frac{1}{2}$ in. gauge GER 2-4-0 engine *Petrolea* made by Kenneth Dean, of Brentwood. Built to LBSC's published drawings and instructions, it nevertheless embodied a number of modifications and additions which, together with consistently good workmanship throughout, made it one of the best examples of this very popular engine.

Obviously, Mr Dean knows, or knew, the GER engines, though his rendering of the Stratford blue is too light. Also, the tyres of the wheels should be *black*. Try this, Mr Dean, and note the change in the effect; in addition to which, it would be correct to prototype.

A VHC was also awarded to J. H. Hatherley, of Sheffield, for a truly outstanding example of the ever-popular $3\frac{1}{2}$ in. gauge 0-4-0 tank engine *Juliet* by LBSC. Here was neatness, good workmanship and finish, very nice proportion and absolute flatness of platework, all displayed *par excellence*. Yet all this was achieved without in any way departing from the essential simplicity of the engine.



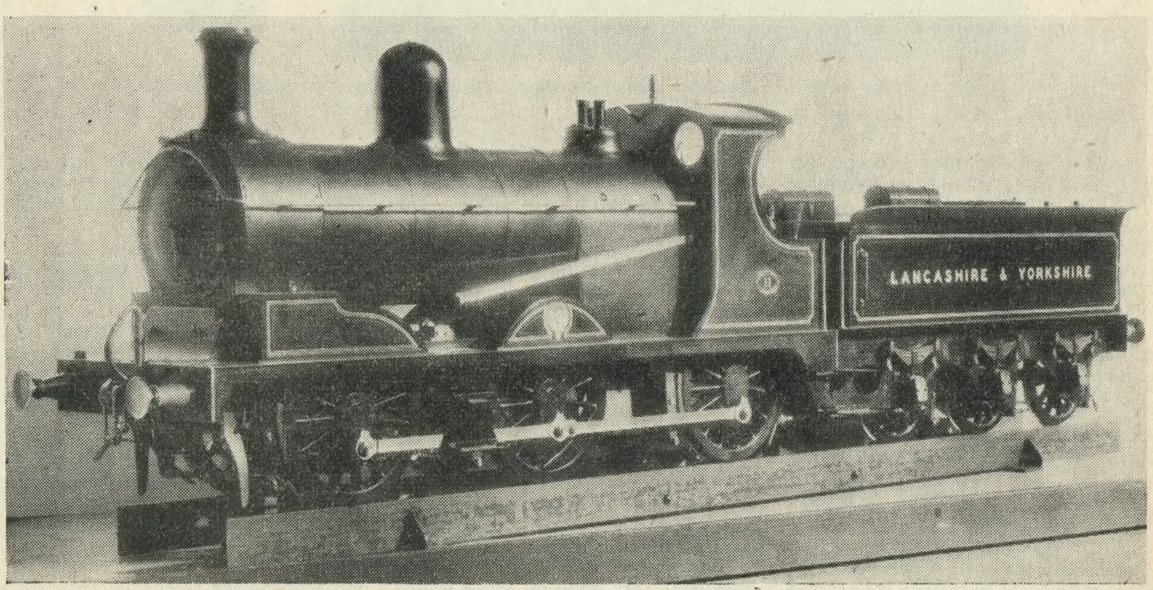
L. R. Raper's Aspinall 0-6-0 *loco excites the admiration of a young exhibition visitor*

A $3\frac{1}{2}$ in. gauge GWR Bulldog 4-4-0 engine, *Camelot*, by K. J. Webber, of Cheddar, won an HC diploma. This was a worthy attempt at quite a difficult prototype, with its double frames and outside cranks; and while the general workmanship is good, if not outstanding, and much of the prototype's very distinctive "character" has been captured, I do feel that the simplification of the bogie has been overdone.

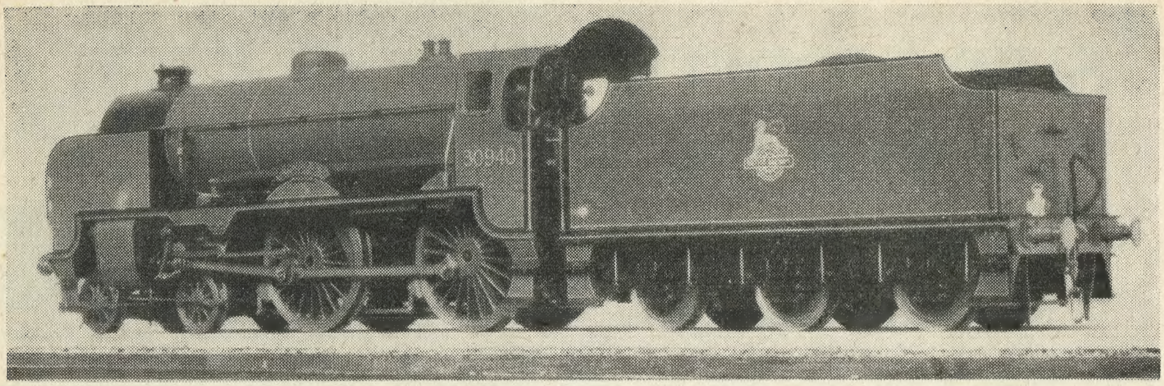
A bogie of this type, correct to scale in appearance, *can* be made to negotiate very sharp curves without any extra trouble; there were two fine examples of it in the exhibition.

An HC diploma was also awarded to the interesting $2\frac{1}{2}$ in. gauge 4-4-4 tank engine built by Mervyn Vest, of Chester-le-Street, chiefly because of the good quality of the workmanship and finish. As a design, this engine has the defect that the driving and coupled wheels are much too close together, which, in a full-size engine, would set up a violent "boxing" action when running, though this may not be very apparent in the model. But one of the tests of a freelance design is to imagine what the full-size version would look like and how it would perform.

Another HC went to a $3\frac{1}{2}$ in. gauge LMS 2-6-0 engine built by A. H.



The championship loco. Another view of the Aspinall 0-6-0 *tender engine, by L. R. Raper*



The 3½ in. gauge Schools loco constructed by R. P. Holdstock

Aloof and A. L. Lee during the last war. It is a neat job, without any complications, and is a good example of a model locomotive built at a time when the hobby experienced very severe difficulties and much frustration due to the restrictions in the supply of castings and materials, not to mention the conditions which made model making almost impossible.

In class B, there was an O gauge steam locomotive which, I think, is likely to show a trend that will grow in the future. It was a *scale* model of a class 5 4-6-0 engine, LMR region, and was really satisfying in all its visible details, in spite of the general simplicity of construction. Its builder, W. F. Gentry, of Bristol, is no newcomer to this sort of thing, and has been working on this scheme for some years.

Two of his previous O gauge steam locomotives, LBSCR 0-6-0 tank, class E1, and 0-6-2 tank, class E5X, have been seen at previous ME Exhibitions, and attracted much attention because of their realistic appearance. He seems to go from good to better with each engine he produces, and this class 5 black Stanier of his fully merits the VHC award which it won.

I have not yet seen it in steam; but having watched the performance of the two previous engines, I have no doubt about the capabilities of this third one. I hope it will encourage other builders to try their hands at something of the kind. ▣

TEACHING MODEL ENGINEERING

Four model engines, each representing a year's course for a group of students in the technical class of the Rayleigh County Secondary Boys' School, were on view at the ME Exhibition. J. COOPER, their instructor, describes how the work progressed under his tuition.

THE models mentioned in this article have been made by senior fifth year boys.

Our "engineering stream" started in an embryo form six years ago when I was asked to take up an appointment on the teaching staff of the school after leaving the Royal Navy.

The drawing office and machine shop, fitted out with standard equipment, started our young engineers on their way, and they were given the following objectives to follow:

To obtain facts about modern industrial machines, materials and methods; to learn the fundamental principles of machine and hand tools, with appreciation of the skills involved; to appreciate the quality of good craftsmanship, and high degree accuracy; and to develop a feeling of responsibility towards others by group projects. (Copies of the MODEL ENGINEER helped considerably to inspire the boys.)

Hence a group of four or five boys were given the task each year of making a working model steam engine. The idea of being able to make a working model was not new to them because, in the fourth year, each boy had to make a small single-cylinder oscillating steam engine. This took each boy about a term to produce, after which, if desired, a boiler was made to supply steam.

The boys were taught draughtsmanship by me and became well used to reading blueprints, as well as making them. Indeed, so good are they, that no boy has failed his ordinary level GCE in geometrical and machine drawing during the last four years! This, with 100 per cent passes in GCE metalwork examinations during the same period, helped to keep up a very high standard with their model engineering.

The model steam engine blueprints and rough castings were bought from Stuart Turner and Kennion Bros, and proved most adequate to our requirements. It was found that four boys could accurately produce, in a little less than a school year, one model, giving each part a first-class finish.

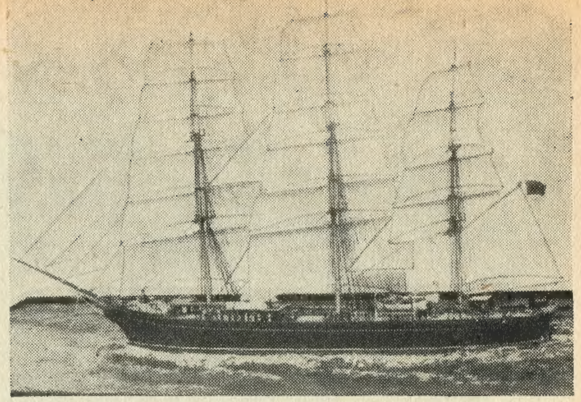
Our first working model was made in 1954-55. This was a horizontal mill engine, 11 in. long, weighing 12 lb. Constructing this gave a great deal of pleasure and pride to the boys. Naturally there were a few mistakes, but with guidance and ingenuity the difficulties were overcome.

The following year, 1955-56, a much heavier engine was produced. It was a vertical engine, with reverse gear, 13 in. high and weighing 22 lb. This was the Stuart No 1, 2 in. bore × 2 in. stroke, a real man-size job which was tackled with great enthusiasm by the lads.

Last year, 1956-57, our project was the Stuart No 9, a horizontal engine, 1½ in. bore × 1½ in. stroke, 11 in. long and 11 lb. in weight. It was fitted with governor gear. This engine in its finished state looks a very compact job and the team who made it feel justly proud of their efforts. ▣

★ SHIP MODELS AT THE ME EXHIBITION

By EDWARD BOWNESS



The cup winning miniature by Capt. A. Thomson

SHIP models at this year's Model Engineer Exhibition reflect the tendency I have noticed for some years past in the direction of more and better miniatures and fewer large models. It may be that the present-day housing conditions tend against large models, and also that the tempo of modern life discourages ship modellers from attempting a large undertaking.

Be that as it may there is still a very keen interest in ship modelling and I know of at least three or four ambitious models now under construction which will appear at the Exhibition in due course. Obviously these are long-term projects and owing to the ever increasing store of information which is now available they promise, in certain instances, to be better than any seen before.

Another factor which is improving the quality of ship models is the wonderful variety of new materials now available. The development of plastics has opened up fresh possibilities and the new nylon and terylene threads have enabled miniaturists to produce models which would have been quite impossible before these were introduced. In the Exhibition of a few years ago I was showing a tiny brig by Donald McNarry to the late Basil Lavis. After examining it minutely for some minutes he put it down carefully with the remark: "Well, I *don't* believe it." I wonder what the late Percival Marshall would have thought if he could have seen some of the finer ship models at the present day.

THE MINIATURE SECTION

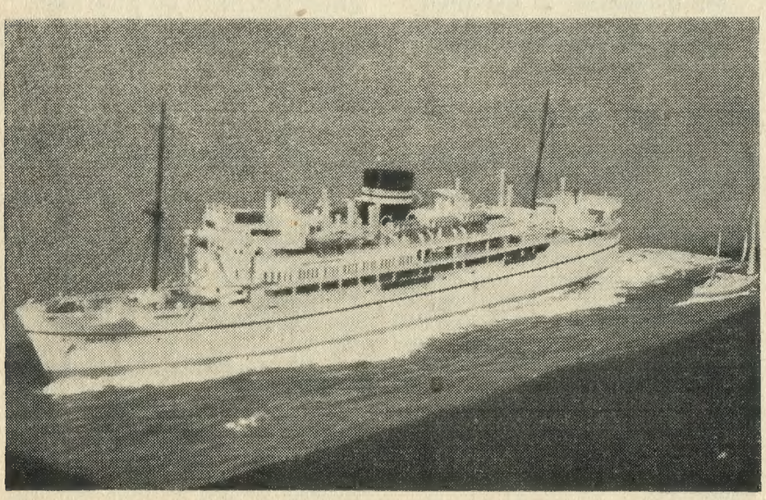
The greatest development seems to be in the miniatures. The Championship Cup in this section was awarded to Capt. Andrew Thomson, of Edinburgh, for an exquisite model of the tea clipper *Titania.* This was to the scale of 1 in. to 24 ft and really deserved the old tag "complete in every detail." Even the buntlines and clewlines were carried down to the deck and belayed to their respective pins. The finer rigging was of split nylon thread. The model was beautifully built throughout, and was well up to the standard set by the experts in this type of model. Capt. Thomson is master of a Shell tanker and his model of the tanker *Auris,* sister to the ship he commanded then—which won a silver medal three or four years ago—will be remembered.

R. Carpenter, of Brighton, won a silver medal for his model of m.v. *Eskbank*—not a glamorous prototype but an extremely neat model. The laid deck was a marvellous piece of work. The tiny m.t.b. which was included in the scene was an attractive feature.

Bronze medals were awarded to A. S. Randall, of London, SE20, for a model of the Grimsby trawler *Leda* shown at sea hauling the trawl, to D. A. S. Hughes, of London, SW3, for a waterline model of the British India liner *Kenya,* and to Arkadu Ushakov, of Leningrad, for a waterline model of the atom-powered icebreaker *Lenin* now under construction. This was a beautiful piece of craftsmanship and although the materials used gave glamour rather than realism, the black hull with its red boot topping, brown decks, and white superstructure and masts, blended into a very effective model.

The half model of the cruiser *Varyag* (*circa* 1900) by Sergi Uriev, of Leningrad, in its oval panel with its background of pale blue watered silk and the foreground a sea of dark blue velvet, was a lovely period piece and gave the impression of an exquisite Wedgewood. The boats were particularly well done and the rigging was extremely fine and delicate. In addition to a VHC certificate, it was awarded the Commander Dennison prize.

Another Russian model, the tiny square-rigged sloop *Mirni* by M. Chernakov, of Leningrad, with its tortoise shell hull and ivory sails, was greatly admired and in addition to the VHC diploma was awarded the Sawers Prize as being the best model which complied with the rather special conditions for this award. The prototype for this model took part in the



A realistic miniature of the BI line KENYA *by D. A. S. Hughes*

Russian Antartic Expedition of 1820.

Some of the miniatures lost points for small defects which could have been avoided with a little thought. In one, at 1 in. to 100 ft, the copper sheathing was made in separate sheets, which really is too much to attempt at this scale. Copper paint would be more suitable. On another, a waterline model of a sailing ship, the shape of the run under the counter was much too square and angular, although the rest of the model was very realistic.

Seas are still a problem with scenic models and unless the modeller has considerable artistic ability he would be well advised to show his model on a stand. The same applies to figures. The artist has always considered the human figure to be the severest test of his ability to draw—that is, when sound drawing *was* appreciated—and, much as I like to see figures on a scenic model, before the ship-modeller attempts to show them he should make some study of the figure. Whatever the pose, the bones of the limbs retain their original length and this simple fact is often overlooked.

Some competitors who send in work year after year seem to vary from one type to another. This is a mistake as few builders are likely to become expert unless they find the type and scale of model which suits them best and stick to it. Scale is very important as the technique required varies from one scale to another, and practically everyone has one scale which comes to him most naturally.

STEAMERS AND MOTOR SHIPS

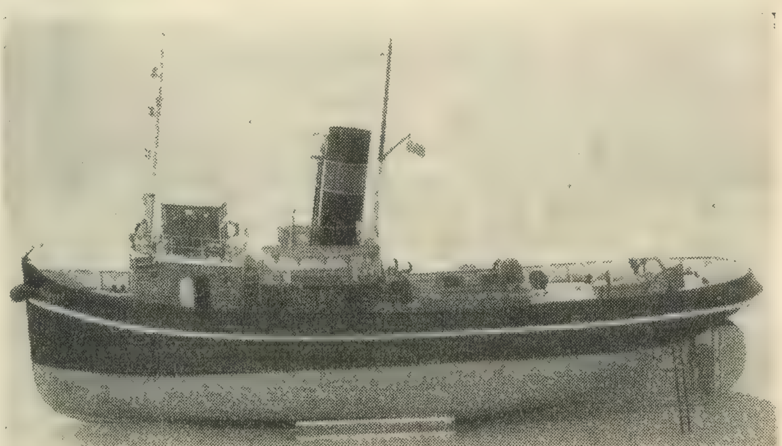
The non-working steamers and motor ships were somewhat disappointing this year, none of them winning a higher award than the VHC diploma; the three which reached this standard being from the Soviet entries. In fact the Russian models were, in some cases, quite up to medal standard but for the fact that suitability of material was one of the things taken into consideration—and rightly so. A ship model at its best is a miniature representation of a ship and should give an accurate impression of the original. Ivory is a superb material in which to reproduce fine detail, and as a decoration it gives a beautiful effect especially when suitably mounted. A number of the Soviet models were exquisite examples of craftsmanship and their mounting and presentation left nothing to be desired. The ruffled velvet in the base of some of them gave the impression of a partly frozen sea and harmonised perfectly with the white ivory ships.

The model of m.v. *Krim* (Crimea) by Nikolai Kaminski, of Odessa, was much more of a ship model than the ivory ones from a British point of view, and very nearly qualified for a bronze medal. But owing to the fact that the decks were not cambered, the model looked stiff and angular, and had none of the easy flowing lines that characterise a fine ship. Perhaps the prototype had flat decks, but I very much doubt it. In some parts such as the window framing the builder relied on the paint brush rather than modelling, although in other parts, such as the railings around the stern, the deck cranes, and other deck details, the modelling was first class.

A fine model of a Hankow Bay junk by J. Hardy

In the working steamers, the Russian competitors again scored, the Championship Cup being awarded to Alexander Vicherov, of Nikolaev, for his model of the tanker *Mockba*. A photograph of this model was sent us along with others early last year. I admired it at the time and reproduced the photograph in the article on "Ship Modelling in Russia" in MODEL ENGINEER for 8 March 1956. I was, therefore, particularly pleased to see the model itself, especially as it came up to the highest expectations. The hull is of tin-plate with lovely lines and a very fine finish. The deck fittings are perfect, the windlass being especially well detailed. On lifting the pawls the anchor cable—which is studded—runs out most realistically. For a working model a wonderful amount of detail has been included.

The power unit is an electric motor, which is installed aft, the batteries being carried amidships under the bridge. I understand that a gyroscope



The impressive tug ENERGY *by Chas Blazdell, awarded a silver medal*

Ship models at the ME Exhibition

is installed for steering. The builder gamely offered to put the model on the tank and demonstrate it under power. He was unable to enter it for the Grand Regatta at Victoria Park as the team commenced its return journey on the closing day of the Exhibition.

The tanker had two very close rivals in the steam tug *Energy* by Chas Blazdell, of Norton, and the cabin cruiser *Edie* by William Morss, of London, which were both awarded silver medals. The tug was a rather big model, powered by a fine triple expansion engine and a very capable looking boiler. The power plant was well arranged and the interior of the hull nicely finished. The boats were not quite up to the standard of the rest of the work and but for one or two small defects the model might well have won the cup.

Similarly with the cabin cruiser *Edie* by Mr Morss. There was practically nothing to fault in this model except that some of the judges considered that a twin or a four-cylindered engine would have been more appropriate for the type of craft. Further, a tanker at ⅛ in. scale or less is a more difficult and complicated undertaking than a cabin cruiser at 1 in. scale. However, the Willis Cup was awarded to this model and the tug was awarded the prize from Commander Dennison. in addition to a silver medal for each.

There were no other outstanding models in this section, none of them qualifying for a bronze medal, and only three for the VHC diploma. One of these was that of *Sealight* by W. A. Brewer, of London, SE10, a Clyde puffer to Harold Underhill's recent design. The Clyde puffer is a very interesting prototype and, being a small ship, produces a model at a big easy scale. The model was a nice straightforward piece of work.

NON-WORKING SAILING SHIPS

There was no big square-rigged ship model in this section, but in the unrigged model of the frigate *La Licorne* by F. A. A. Pariser, of Kidderminster, we had a fine example of craftsmanship in shipbuilding. The scale is ¼ in. to 1 ft and all the framing is shown. The wood is left in its natural colour, which is perhaps justified as the ship may be considered as being unfinished, but to have painted it would, in my opinion, have added considerably to its interest and value as a ship model. There was no better model in this section so, naturally, it won the Championship Cup.

A close contender for the cup was the scenic model of Severn Trows by A. E. Field, of Streetly. The models in this entry were practically faultless as models, as one would expect from Mr Field, who has won the Championship Cup in two or three previous ME Exhibitions; but it was a scenic model and as such was not quite perfect. The houses on the quay could have been better. The old half-timbered house looked as new as the others, and in no case had the roof sagged, which, to say the least, is unusual in old houses. The cobbled pavement was not very realistic. Little things like these decided the issue, and not any defect in the models. In addition to its silver medal this model was awarded the Evan's Trophy for research and presentation.

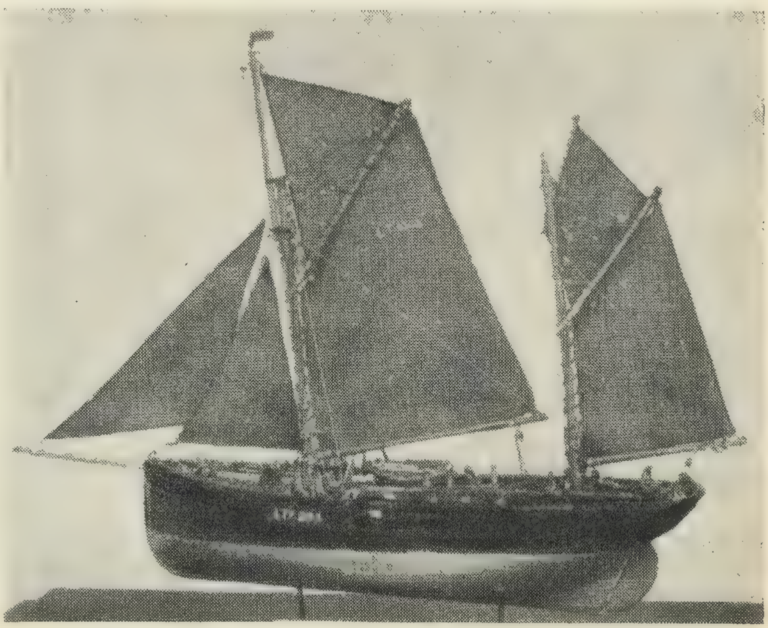
The Thames bawley by D. B. Sanglier, of Birmingham, was beautifully built and rigged, but the cloths on the sails were too wide, which lost it a few marks. Similarly with the brigantine *Leon* by Capt. Moroney, of Wembley. The hull and rigging were very good but the sails were rather stiff and detracted from the model. The 80 gun ship of 1700 by H. F. Milne, of London, SE25, was a very pleasing model. With a little more attention to finish and neatness this competitor could produce very fine work. These three models were awarded VHC diplomas.

There was rather a small entry in class G, working models of sailing ships, and only one qualified for a medal. This was the 10-rater yacht *Laughing Water* by C. J. Buckman, of Welling, which had lovely lines and was beautifully built. The terylene sails created considerable interest, although they are, of course, a commonplace with model yachtsmen.

The Loan Section included a few interesting ship models. Among these were two by Donald McNarry—one of a Stuart Royal Yacht of 1661 and the other of HM Revenue cruiser *Diligence* of 1817. Both of these were beautiful examples of Mr McNarry's work and were undoubtedly an inspiration to other miniaturists.

Another good model was that of the full rigged ship *Carmarthenshire*, by R. C. MacCormac, of London, SW19. This was a working model and although small for this type embodied a lot of accurate detail. It has sailed well at the Thames Club rallies on the Round Pond.

I have had space to mention only a few of the models and my notes have by no means exhausted the list. While this could not be considered a vintage year as far as ship models were concerned, many of the models were fine examples of the craft and made a visit to the Exhibition a rewarding experience. ▣

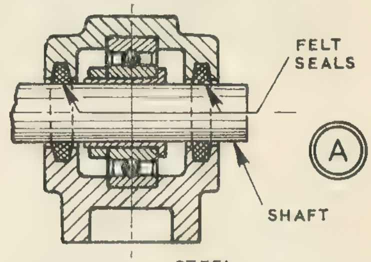


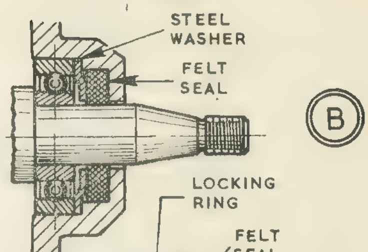
A wonderfully detailed model of a trawler by 89-year-old E. Baynes Rock

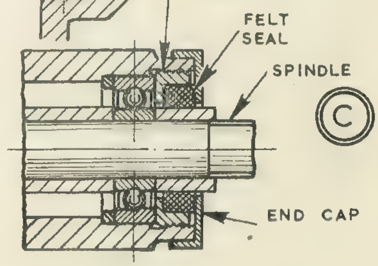
GEOMETER deals with the problem of retaining lubricants under speed and load

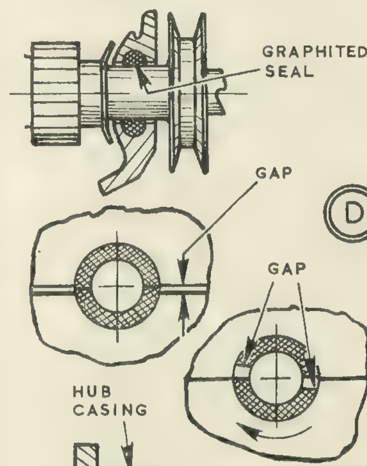
Beginner's Workshop

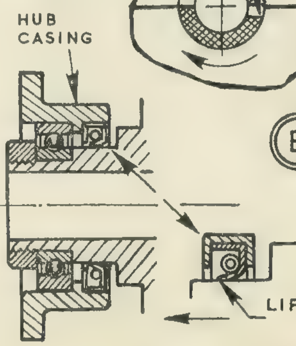
Felts and oil seals











RETAINING lubricant in bearings and casings of engines and machines is a problem that can be solved in various ways depending on such factors as type of lubricant, speed and loading of bearings, heat to which lubricant and assemblies are normally subjected. With the advent of wear, the problem eventually recurs for users in a large number of cases—or earlier if recommendations are neglected or disregarded, or working conditions become severe.

Avoidance of trouble often depends on adhering to a suggested type of lubricant, or indicated quantity if it is oil. Another type, or a larger quantity, may lead to escape and further trouble—such as if instead of high melting point grease, the ordinary variety is used to pack bearings of magnetos and dynamos, or a car rear axle is filled with the wrong oil, or over-filled—when the escape will be on to the brakes.

Heavier loadings on bearings, or faster speeds with increased heat, may also occasion escape of lubricant where none has occurred before. Thus, in the case of car hubs, a long fast journey on a hot day is much more likely than local ambling to and fro to reveal shortcomings in sealing—which may be evidenced by traces of oil and grease radiating from hubs to wheel rims.

Important considerations for a soft seal are resilience and flexibility to grip the shaft or component where relative movement occurs, and imperviousness to the lubricant retained. If the seal is hard, a small crescent-shaped gap appears with slight wear or wobble, and is sufficient to allow considerable leakage over a period—a fault that may occur with some synthetic seals.

Ordinary rubber is unsuitable for sealing oil and grease because of their softening action on it. Leather may be effectively employed but not in the simplest installations because of a tendency to split if stretched, and a lack of continued resilience to compress unless aided by a spring device. Felt, however, as a ring or strip, possesses the necessary qualities for many simple installations.

In a plummer block for line shafting, as at *A*, a felt may be used each side to retain the medium grease employed—the seals fitting in taper-sided grooves machined in base and cap. In assembly, the seals can be complete rings pushed on the shaft, then the base and cap can be clamped about them and the bearing. In repair, when it is inconvenient to remove more than the base and cap, strip felt, cut long enough to compress and with the joint brought to the top, can be used.

In the end of a casing, as at *B*, a felt seal may be in a recess and kept from contact with the bearing by a steel washer, itself dished for clearance against the revolving centre. In assembly, the felt goes first, followed by the washer and bearing. To avoid disturbing a fitted bearing, however, a worn seal can be picked out with a pointed tool, the new one worked in from the bore and seated by entering the taper shaft.

In a motor-cycle wheel hub, as at *C*, the felt seal may be in a recess in the locking ring holding the bearing. Then an end cap keeps the seal in place, and can be prised off when renewal or dismantling may be necessary.

In the timing-case-sump joint of Morris and other engines, a special graphited asbestos seal bears on the boss of the crankshaft pulley, as at *D*. The material is rather hard, and care is required in fitting; if the halves are long, a gap may exist at the joint faces; if the halves are short, gaps can be left in the seal.

A modern type of knife-edged or lipped seal with wide applications as in hubs may be of leather or synthetic material with an encircling coil spring to compress it, the whole in a metal housing easy to fit—which must always be with the lip towards the bearing, as at *E*. ■

The SMEE and CLUB STANDS

Reported by Northerner

A LARGER number of clubs occupied stands this year, which does not make any easier my task of trying to compress a quart—or rather a gallon—into the proverbial pint pot. The exhibits on any one of the stands could well occupy this whole space; in fact, many single exhibits could do so !

As usual, the SMEE stand had a large number of models at work under compressed air, as well as the passenger track. Among the former was C. W. Tidy's oscillating wall engine, which he copied from an old catalogue of about 1870. In this the cylinder trunnions were the steam inlet and exhaust, with packed glands to make them steamtight.

The slide valve, on the front of the vertical inverted cylinder, was actuated by the cylinder movement and a rocking lever, the other end of which worked in a slide fixed to the engine bedplate.

Commander W. T. Barker's well-known historical marine engines were not present this year, but he had a pretty little horizontal engine and a tiny steam reversing plant for a marine engine at work. Another fine working model was J. G. Archer's Burrell single-crank compound traction-engine, which when finished should be a very good example indeed.

For perfect craftsmanship it was a delight to examine closely D. G. Webster's ¾ in. scale chassis of the Great Western single *Achilles*. The detail was superlative, and it seems a pity that much of it—the gibbed and cottered split bearings on the connecting-rods, for example—must be hidden as the engine grows.

On the NAME stand one of the outstanding exhibits was by another master-craftsman, A. W. G. Tucker, of Bramhall, who is building *Britannia* in equal detail. For example, the pony truck has reversed camber leaf springs and correct rubbing pads, the main axleboxes are connected by cannons, and the stays between the frames are all correctly shaped and riveted. All this work is to the official BR drawings. In passing, in the Competition Section, Mr Tucker's Savery triple expansion marine-engine had won the Duke of Edinburgh Trophy.

In direct contrast to the locomotives, but equally well finished and detailed, was the old-time joiner's workshop modelled to 1½ in. scale by C. Ingham. The workbench and tool-rack carried a full set of tools, and a pole-lathe stood on one side. In front of the bench a stool and antique chair showed the skill of the maker too.

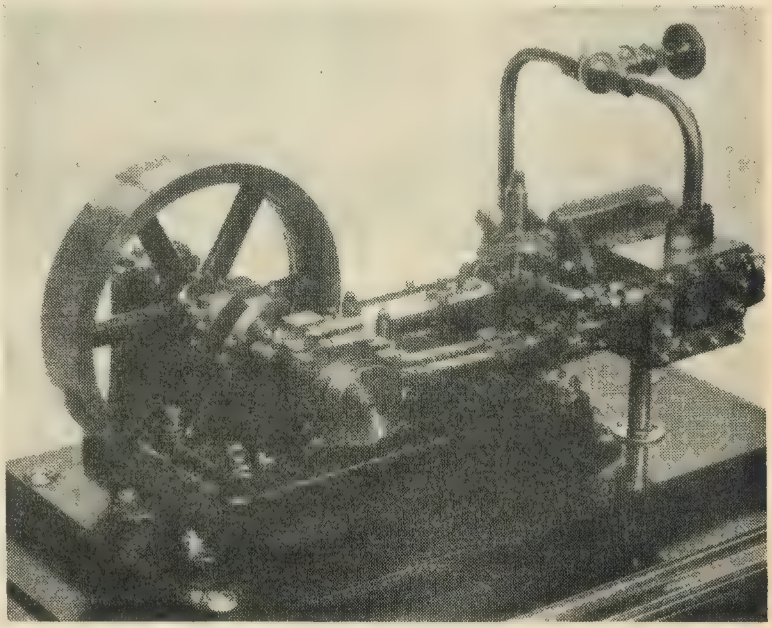
I described F. D. Woodall's Western River towboat *Duquesne* in my report of the Northern Models Exhibition, so need not do so now. However, it did create great interest, and so did his two winding engines, which are complete in their houses with all accessories, to a scale of 5 ft to the inch.

It was good to note, by the way, that at least two more major awards came to NAME members—the Locomotive Championship Cup to Louis Raper for his Aspinall 0-6-0, and the Aveling-Barford Trophy to E. Hinchliffe for his single-crank Burrell. A VHC also went to J. H. Hatherley for his *Juliet*, which I feel sure would have gained an even higher award had there been more of it, so to speak.

The Malden and District SME is fortunate in having as a member S. T. Harris, who built that magnificent model Fowler *Supreme* now in South Kensington. On their club stand he now exhibited a horizontal steam engine. It was mainly constructed from Stuart Turner castings, but with several modifications.

The chief of these was the fitting of an expansion valve on the Meyer principle, controlled by a Porter governor. The engine was initially constructed fifty years ago, when Mr Harris was a youth, and the Meyer gear was added thirty years ago. Even then he was evidently the same stickler for finish and detail, which is beyond reproach.

Also on the Malden stand was a good exhibit by H. W. Saunders; a 5 c.c. watercooled side-valve petrol engine. This was made up from two



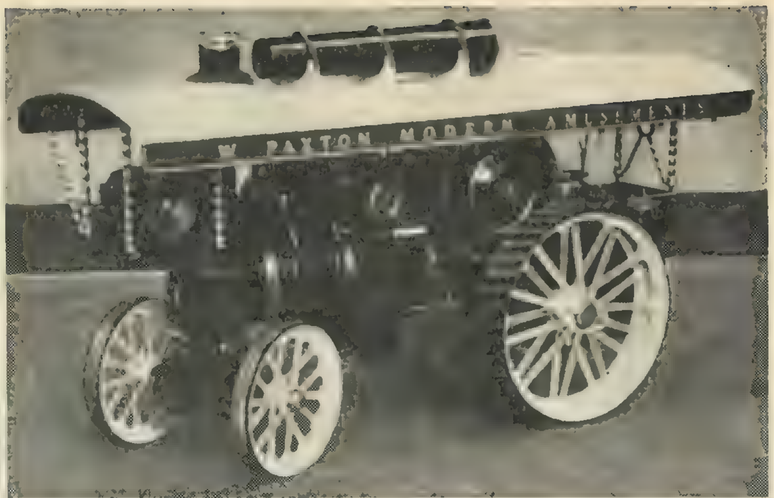
This very fine engine, with Meyer expansion gear, was built 50 years ago

Westbury designs, with a Kinglet crankcase and a Seagull cylinder. Mr Saunders had made his own steel moulds and castings, and these were displayed along with the finished engine.

On the stand of the Sutton MEC was a partly-finished 1 in. scale model of an Easton and Anderson beam engine. C. W. Tidy, whom I have already mentioned, had fabricated the cylinder, beam, bed plate, and other parts, and very handsomely too. All the bearings were split, and those of the connecting-rod and parallel motion were gibbed and cottered. The prototype worked in a hospital, where Mr Tidy measured it up and then made his drawings.

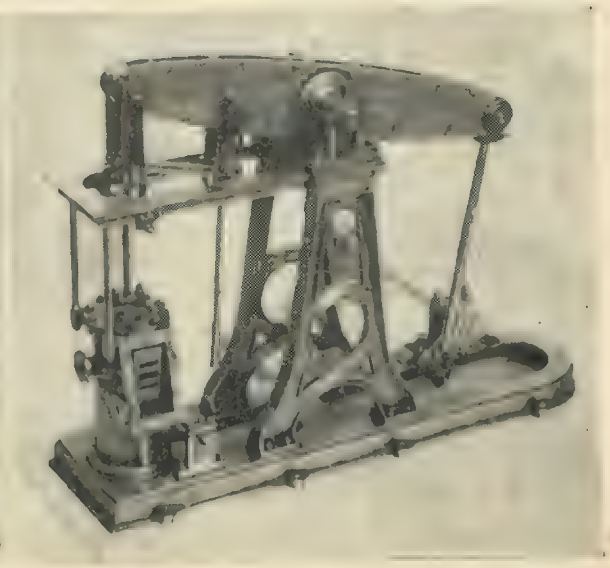
Two locomotive chassis with good work were the 3½ in. gauge *Virginia* by 18-year-old D. C. Howard, and the 3½ in. gauge Schools class by A. C. Jensen, a first attempt at locomotive work. Both mechanical and hand finish were good, and on Mr Jensen's nearly complete tender there was excellent detail.

An eye-catching model was W. Paxton's 2 in. scale compound show-



Right, top: A 2 in. scale freelance showman's engine which displays strong Fowler influences. Below it: Built to 1/60 scale, Frank Woodall's Western River towboat is a working model

Below, left: Valve gear, akin to marine oscillating engines, is a feature of C. W. Tidy's wall engine. Below, right: There are no castings at all in this Easton and Amos beam engine, being built to 1 in. scale by C. W. Tidy



The SMEE and CLUB STANDS . . .

man's road locomotive, described as freelance but owing very much to Fowler practice. The engine has done a great deal of work, and is often in steam for four or five hours at a time at fetes and similar functions.

The stationary engine section of the North London SME are building a very good model of a Cochran boiler to 1½ in. scale. It is a closely detailed working scale model 7½ in. dia., made from official drawings, and when completed will be used to steam stationary engines at club meetings and exhibitions.

On the same stand was a large freelance model m.t.b. by E. Pritchard with six-channel radio control. The hull was built with ply bulkheads and stringers, sheeted with balsa. After sanding to shape, the latter was covered with a layer of fibreglass for strength. A 10 c.c. o.h.v. engine was fitted, but Mr Pritchard is going to try her out with a 15 c.c. two-stroke and a 30 c.c. o.h.v., which are currently under construction.

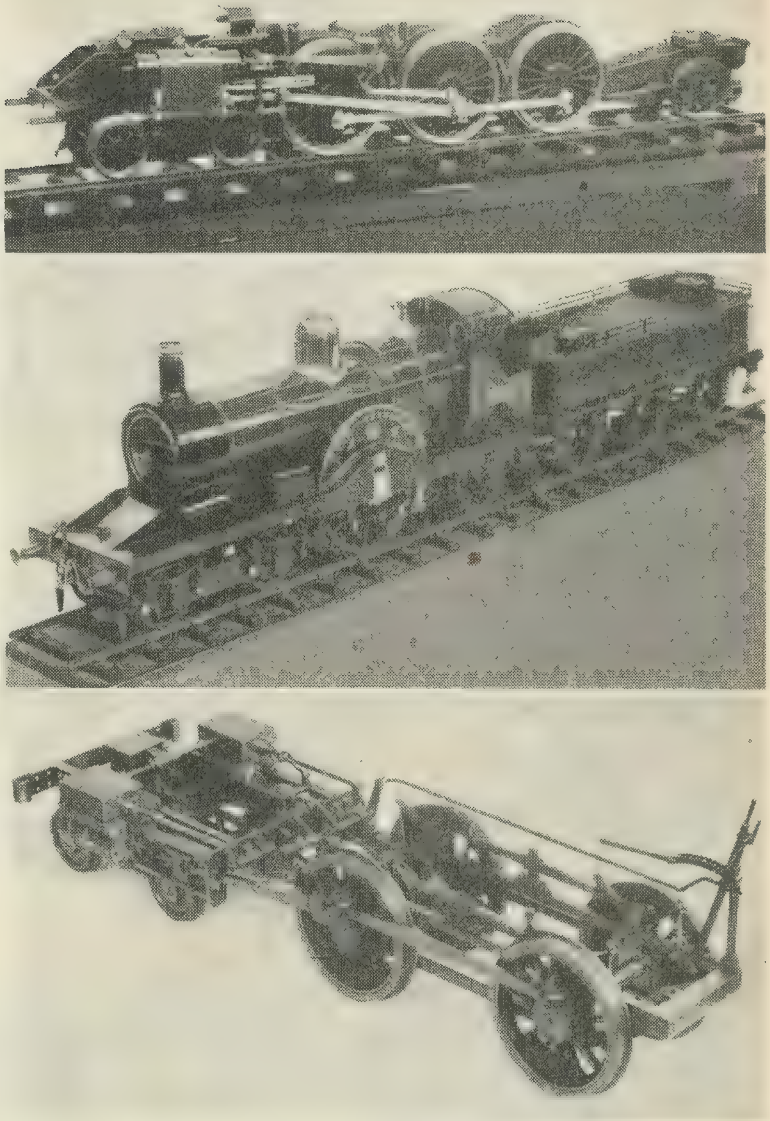
An unusual radio-control model was the 1 in. scale Vauxhall *Vega* coach by E. Simes, also of North London. In this case the radio controlled the steering, lights, hooter, and forward and reverse gears.

Twin overhead camshafts

One of the impressive models on the stand of the St Albans and District MES was F. Waterton's 4 ft 6 in. launch *Avocet*. The 30 c.c. petrol engine has six cylinders and twin overhead camshafts, and is magneto equipped. Twin screws drive the hard-chine hull which is diagonally planked in mahogany and bright varnished.

K. Hyder's hydroplane *Slipper* 5 with its 10 c.c. McCoy engine has a maximum speed of over 70 m.p.h., I learned, and P. Lambert's twenty-year-old destroyer, a satisfying model, has steamed more than 100 miles in only one of those years. Close at hand was the 3½ in. gauge *Hielan' Lassie* built by W. Thrale, which has hauled more than 10,000 children. Worthy performances all!

Dominating the Vickers-Armstrongs club stand was M. A. Shepherd's model of his own design for a long-range air liner of the future. Fully furnished in cockpits and cabins, the model has jet engines in the tail, its main planes forward of these, and its "tail" planes further forward still.



Top: Working to official drawings, A. W. G. Tucker displays excellent craftsmanship in his BRITANNIA. *Centre: C. M. Keiller's ½ in. scale singlewheeler was an attraction on the SMEE stand. Bottom: Eighteen-year-old D. C. Howard is making a good job of his* VIRGINIA

Other aircraft models were Great War types by A. Bristow—the Avro 504K of 1916, the FE8 "pusher" of 1916, and the RE8 of 1917. Locomotives were represented by F. H. Higgs, with two 7 mm. scale models; an LMS 2P class, and a 3F side-tank, both of good workmanship.

The Tramway and Light Railway Society were showing various types of trams ranging in size from 4 mm. to ¾ in. scale. Narrow-gauge enthusiasts found much to interest them on the stands of the Festiniog Railway Society and the Narrow-gauge Railway Society.

As for ship-modellers, they too were catered for amply by the Ship Model Societies stand, and that of the Model Power Boat Association—all in addition, of course, to the magnificent display in the main body of the Hall. ▣

A WORKING MODEL OF

ST NINIAN

Part 19—The series is nearing conclusion. This week the author describes the final details for the davits, the masts and rigging and the engine-room skylight

By EDWARD BOWNESS

Continued from 5 September 1957, pages 348 to 350

The lead of the falls for the davits described in our last instalment may be followed from the drawings, Figs 80 and 81. In those for the forward davits, Fig. 80, the ends of the two falls are secured to the winding drum. This is in two sections and each carries more than sufficient length of wire to enable the boat to reach the water when lowered.

From the forward section of the winding drum one of the falls passes round the inner of the two guide pulleys under the channels, up to the pulley at the upper corner of the aftermost track, down to the lowest pulley on the after side of the arm, up and around the crook of the arm to the pulley at its head.

From there it passes around the gin block, which carries the eye and ring for the hook by which the boat is suspended, up to the head of the arm but on its forward side, down the arm, up to the upper corner of the track and down to the eye on the inner side to which it is secured. It is obvious that holes or slots must be cut in the curved plate at the upper corner of the tracks to clear the fall.

The other fall passes around the outer of the two pulleys under the channels and across to a similar pulley on the forward track, up to the forward side of the forward davit arm, around the gin block and down the after side of the arm to be secured as was the case with the first fall.

The falls for the four sets of davits for the after boats are the same except that on the after side of the after arm the lead is direct from the pulley at the upper corner of the track to the pulley at the head of the arm. From that point it is the same as those on the forward davits (Fig. 81).

Similarly with the forward arm, the lead on the forward side is direct from the track to the head of the arm, the reason being that, owing to the shape of these davit arms as compared with that of the forward davits, there is no chance of the fall fouling the boat on the outside of the arms and, therefore, the two extra guide pulleys can be dispensed with.

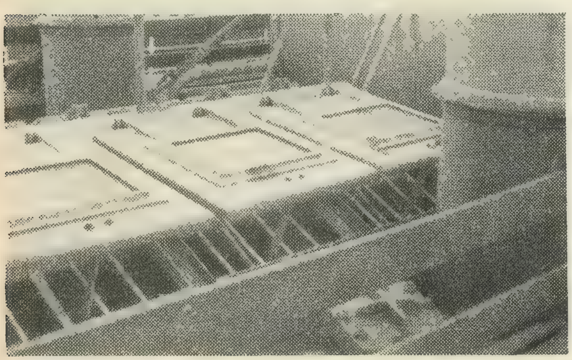
The gin block is made from a sheet of thin brass cut to the shape shown in Fig. 85 and bent over as shown, with a pulley, which is free to rotate on its spindle between the sides. The pulley is $\frac{1}{8}$ in. dia. at the bottom of the groove. A tiny reinforcing plate is soldered on at the bend, which is then drilled and fitted with an eye to which a short length of chain is shackled. This chain consists of three or four links and a hook on the end which engages with the eye in the lifeboat. Twelve are required.

MAKING THE DAVIT WINCH

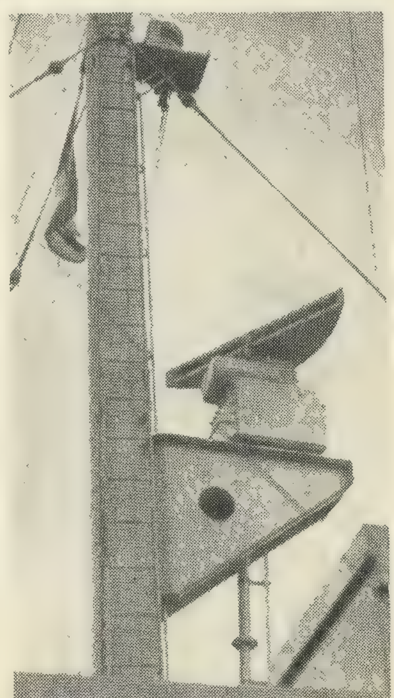
A simple representation of the winch can be made suitable for control by hand or by radio. The drawing, Fig. 86, is reproduced twice the size of the model for the sake of clearness. The body of the winch is cut out of a block of mild steel to the size and shape shown and drilled for the spindle of the winding drum. The winding drum is turned from a $\frac{5}{16}$ in. or $\frac{3}{8}$ in. brass bar and the flanges are left as high as possible so as to retain the length of rope required. The block on the end of the spindle simulates the brake housing but is pinned to the spindle for rotating it.

The tumbler, which is made from 18 s.w.g. mild steel sheet, is so shaped that its short arm acts with a jambing effect to hold the drum when the boat is stowed, and to keep the falls tight so that they do not come off the guide pulleys. The long arm acts as a brake. When the weighted lever is raised, either by manual or radio control, the drum is free to revolve and further raising of the lever applies the brake so as to control the boat as it is being lowered. The tumbler is pivoted on a 12 BA screw and the body is soldered in position on its bracket.

Note that for the davits for the after boats the fall comes off the drum from below, and from above for the forward davits. The tumbler bracket as drawn is for the after starboard and forward port davits and must be assembled the opposite way for the



Left: The engine room skylight, showing the forestay from the lower band on the mainmast.



Right: The foremast, showing the ladder, the masthead light and its bracket, and the radar scanner

forward starboard and after port ones.

For flexibility the falls should be of fine nylon or silk thread, and also so that the requisite length can be wound on the drum. The fixed end could be cemented to the drum.

A wooden pad, against which the boat is held by the gripes, is cemented on the front of each davit arm. These could be made of balsa or other soft wood and should be a good fit against the side of the boat.

The gripes are of good strong cord, which is passed round the boat at each end and around two pegs or hooks on the inner or facing surfaces of the tracks. To keep them in tension the ends should be connected to a small coil spring located between the inner edge of the boat and the pin on the track, as will be seen in Figs 80 and 81.

FIXING THE DAVITS

The tracks for the forward boats are bolted down to the boat deck by a 10 BA bolt through each soleplate inserted from below. A countersunk screw could be used to simplify assembly. Those for the four after boats have three attachments to the superstructure: at the inner end they are bolted to the boat deck, midway the soleplate is soldered to the upper edge of the promenade deck cabins, and at the lower and outer end the gusset plate is soldered to the side plate of the superstructure Fig. 42 [May 2] with the soleplate resting on the promenade deck.

Guy ropes are fitted between the heads of the davit arms and two pendants are spliced on to each of them. These are clearly shown in the photographs on page 582 [April 18] and page 273 [August 22].

On the ship herself the four after lifeboats are fitted with the Schat Boat Skate. These are very popular fittings, their purpose being to protect the boat as it is being lowered down the side of the ship. They are especially valuable if the ship is heeling at the time. They consist of a series of blocks of wood shaped to fit the side of the lifeboat and mounted on an iron strap which is hinged between each block. They extend from the inner gunwale of the lifeboat around the bilge from whence a rope passes under the keel and up to the outer gunwale where it is provided with a tensioning screw. There are two Skates on each boat, spaced about five or six feet apart.

In some varieties the Skate is hooked on to the keel and brought up to a tensioning screw on the inner gunwale. Those on *St Ninian* are of the first-mentioned type. They may be seen in the photograph on the cover of the issue for February 7 and in that on page 582 [April 18]. For some reason the two forward boats do not appear to have them. They are, however, not a prominent feature and could well be omitted in a working model.

MASTS AND RIGGING

The foremast of *St Ninian* is 44 ft high above the roof of the wheel house, its diameter at the base is approximately 16 in. and at the truck is about 6 in. The rake of the mast is 1 in. per foot. The mainmast is 51 ft 6 in. above the promenade deck, thus making the two trucks the same height above the sheer line of the ship. Its diameter is the same as the foremast and the rake is $1\frac{3}{8}$ in. per foot.

The masts are stepped on their respective decks, not being carried through to a lower deck, their stability depending on the deck fixing and more especially on the rigging. The same arrangement will be quite satisfactory in the model; the only time there is any risk is when the superstructure is removed and the mainmast backstay disconnected; without the backstay the mast is not well stayed aft. However, the deck fixing, together with the two side backstays and the shrouds, should be sufficient for everything except gross carelessness.

Lancewood, or a similar strong, springy wood with a close grain, is the best material for masts. Part of an old fishing rod would be found very suitable. The foremast will be 8.8 in. long and the mainmast 10.3 in., the diameters being $\frac{3}{16}$ in. at the base and 3/32 in. at the truck. These diameters are a little overscale but are advisable for safety. If first-class wood is not available even these diameters should be increased slightly. The taper is not uniform throughout, most of it taking place above the lower mast band. The trucks are brass discs $\frac{1}{4}$ in. dia. $\times$ $\frac{1}{8}$ in. thick with rounded edges. A central hole receives the end of the mast and two tiny holes are drilled to one side for the flag halliards.

Brass sockets should be made for each mast as shown in Fig. 87. The tube must be a tight fit on the mast. The flange, which is $\frac{7}{16}$ in. square, is made of 20 s.w.g. sheet and drilled for four round-headed screws about 000 $\times$ $\frac{3}{16}$ in. If a small hole is drilled right through the tin-plate deck underneath the planking the point of the screw will thread itself into the tinplate and hold. The flange should first be cemented to the planking.

The lower mast band on the foremast is placed 4.6 in. above the deck and the upper one 7.8 in. They should be about $\frac{1}{8}$ in. wide and a tight fit on the mast. A tiny hole must be drilled through the band and mast transversely, and a piece of 20 s.w.g. brass wire driven through and formed into an eye at each end, for the shrouds. On the mainmast the lower mast band is placed 4.8 in. above the deck and the upper one 9.1 in.

A ladder made of fine wire is fitted to the starboard side of each mast. It is interrupted at the lower mast band, as will be seen in the photograph on page 405. The sides of the ladder must be pinned to the mast at intervals. They are spaced about 5/32 in. apart at the foot and approach one another slightly as they reach the upper mast band, where they terminate.

The photograph shows also the bracket for the masthead light. This should be about $\frac{1}{4}$ in. long, soldered to the mast band and strengthened by a wire from below. On the foremast the bracket is on the lower mast band, and on the mainmast it is on the upper. The radar scanner is also clearly shown with its mounting. The triangular bracket which carries it projects about $\frac{3}{4}$ in. from the mast, and the general outlines of the whole fitting can be seen. Although this has been added since the ship was first built it is an attractive and modern feature and should be embodied in the model.

THE RIGGING

The rigging is shown in the general arrangement drawing on pages 96 and 97 [January 17]. For the foremast there are two shrouds on each side from the eyes in the lower mast band down to the bulwarks on the boat deck, being spread well apart fore and aft of the mast. A pair of backstays comes from the upper mast band down to the bulwark just aft of the aftermost shroud.

The forestay is taken from the upper mast band and is fixed just aft of the jackstaff in the D-shaped plate at the stemhead. As the forestay must be disconnected when the superstructure is removed it must be hooked into a hole or an eye in the D-plate. A small coil spring about $\frac{1}{2}$ in. or $\frac{3}{4}$ in. long should be interposed between the end of the stay and the hook, to make it possible to disconnect and still retain the necessary tension to keep the stay taut.

The rigging should preferably be of stranded wire, and its diameter should not be more than 1/32 in. Where the end is spliced or has a loop this can be done very simply by turning a small ferrule as shown in Fig. 88, tinning it, slipping it over the end of the wire, looping the wire and then forcing the ferrule over the end until it is firmly wedged when it can be further secured by the touch of a soldering iron.

Each pair of shrouds can be made in one but in this case must be seized

together just below the eye in the mast band. Their lower ends could have an eye made as explained above and may then be tensioned by seizing with a short length of fine wire (florist's) between the eye and the anchorage at the bulwarks. The backstays could be treated similarly.

The mainmast has similar shrouds and backstays but the shrouds cannot be spread very widely as they must be secured to the removable superstructure. In the general arrangement drawing they are not shown very clearly in the elevation but can be followed easily in the plan. There are two forestays on the mainmast, one from each mast band and both are secured to eyes on the ridge of the engine room skylight. That for the stay from the lower band may be seen in the photograph of the engine room skylight in this issue, and the other is at the forward end of the skylight.

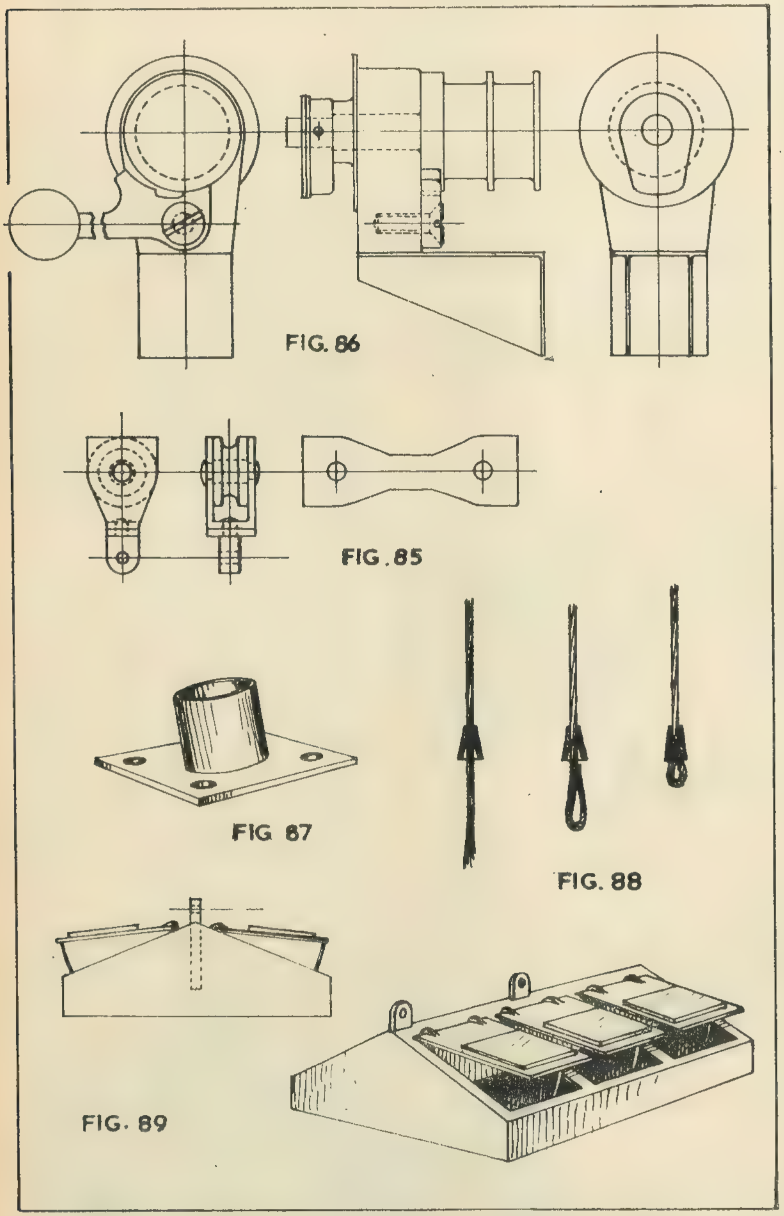


Fig. 85: *Gin block for davit arm. Fig.* 86: *Hoisting winch for davits. Fig.* 87: *Socket for base of mast. Fig.* 88: *Ferrule for making an eye on a rope. Fig.* 89: *Engine room skylight*

An additional backstay is taken from the upper mast band to an eye on the docking bridge. This should be fitted with a hook and a tension spring similar to that on the forestay at the stem head, as it must be detached before removing the superstructure. The deckhouse which carries the docking bridge is also removable and, to prevent its being lifted by the tension of the backstay, a hole should be drilled through its after side and through the flange on which the house fits, and a pin inserted. The tension will keep the pin in place and it can be taken out at will.

The wireless aerial between the two mastheads can be fitted as an ordinary stay if it is not required as an aerial. An emergency aerial is fitted to the foremast just below the yard, and is led down the starboard side of the funnel as shown in the arrangement drawing. Leads are taken from both these aerials down to the wheel house, the wireless operator's cabin and office being in the forward corner of the officer's accommodation on the starboard side just aft of the wheel house proper.

The yard, which is about 3 in. long, crosses the foremast about 2 in. below the mast truck, and is supported by slings from the upper mast band. It should be made of 16 s.w.g. wire or split bamboo $\frac{1}{16}$ in. dia., and is parallel throughout its length. A small block, not more than $\frac{1}{8}$ in. long, should be fitted at each end for flag halliards and signalling purposes. The halliards should be led to the upper bridge on top of the wheel house.

The engine room skylight should now receive attention. Its general form is shown in Fig. 89 and the photograph in this issue. The anchorage for the lower of the two mainmast stays may also be seen in this picture. The skylight is fabricated from tinplate and must be made to fit the hole in the base plate for the funnel which is 1.6 in. long $\times$ $\frac{1}{4}$ in. wide [see Fig. 56, May 30]. The skylight is 0.2 in. high along the sides and $\frac{1}{2}$ in. at the central ridge. An 18 s.w.g. plate $\frac{3}{8}$ in. deep should be fixed under the ridge for stiffness, with extensions to which the mainmast stays are secured. Slots for these must be cut in the cover plate of the skylight, in which should also be cut six holes 0.4 in. wide $\times$ 0.55 in. deep, three on each side. The hinges for the covers could be dummies as the covers will be left open permanently for ventilation. Note the supporting struts in the picture.

The covers should have openings in them glazed with Perspex, or the windows could be represented merely by Perspex cemented on the metal.

● *To be continued*

Steam road carriages built nearly 100 years ago

1860. The age of the crinoline and the cravat! Yet passenger-carrying steam road vehicles were a fact. C. E. PAGE describes some of them in this brief review

WAY back in the early 1860s, the farm steam engine had to be transported from place to place by a team of horses, and it was Thomas Aveling who stoutly declared that it was an insult to mechanical science to see half-a-dozen horses dragging along a steam engine. The sight, he said, was as ridiculous as that of six sailing ships towing a steamer! How right he was.

Yet it is not generally appreciated that coeval with the advent of Aveling's first self-propelling engines were several types of light steam road carriages, which were expressly designed and built for passenger transport, being, in fact, tangible results of a renaissance of the heavier steam road coaches of Gurney, Hancock, and others, which had been forced off the English roads by high tolls and by vested interest.

Of these " lighter " vehicles, a most interesting one was that designed and built in 1860 by W. O. Carrett (of Carrett, Marshall and Company of Sun Foundry, Leeds) for a Mr Salt, of Saltaire. The vehicle was exhibited at the Royal Agricultural Show at Leeds in 1861 and at the London Exhibition of the following year, at both of which it attracted considerable attention.

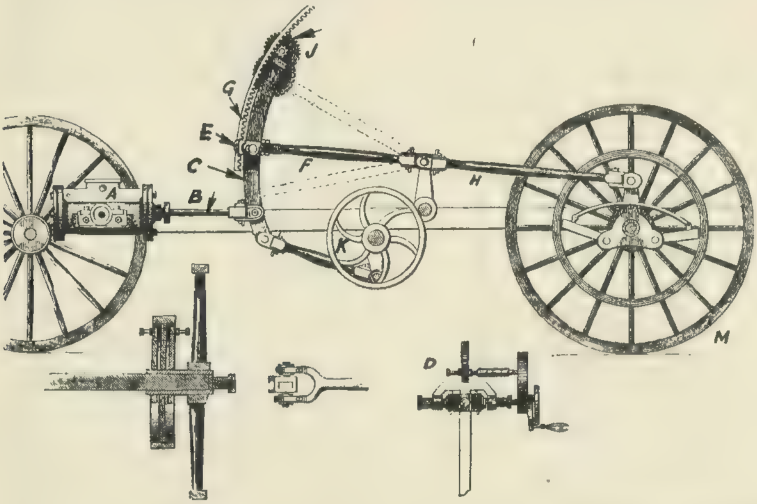
This 6 ton steamer boasted two 6 in. × 8 in. cylinders fed from a locomotive type boiler with a copper firebox and 58 tubes of 2 in. dia. which gave a total heating surface of 100 sq. ft at a working pressure of 100 p.s.i. The rear pair of driving wheels were of steel and were 4 ft dia., while the single front steering wheel was 3 ft dia. The boiler was injector-fed with an alternative hand pump.

Drive from the crankshaft was taken through spur gears of 5 to 1 ratio, the driving wheels being mounted loosely on their axle but secured to a hollow shaft which revolved on the solid one; a differential gear being fitted to equalise the drive. In this latter improvement, it is interesting to note that Carrett acknowledged R. Roberts, of Manchester, as the inventor of the differential, ignoring the prior claim of Frenchman Pecquerier of forty years earlier.

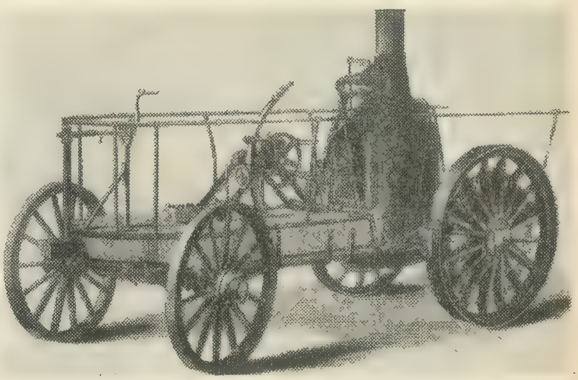
However, the vehicle did little good for itself as a steam carriage, and was in consequence given by its owner to an enthusiastic amateur, Fred Hodges, who promptly christened it *Fly by Night* and tore through the villages of Kent when most of the population were fast asleep—the only time when one could safely move at any speed on a power-driven vehicle on English roads.

Hodges was repeatedly fined, but his exploits were long remembered in the Kentish Weald for he ran for some 800 miles collecting six summonses in as many weeks—one for running at over 30 m.p.h.! *Fly by Night* ended her days as a self-propelled fire engine; but she was a fine job and deserved a worthier career.

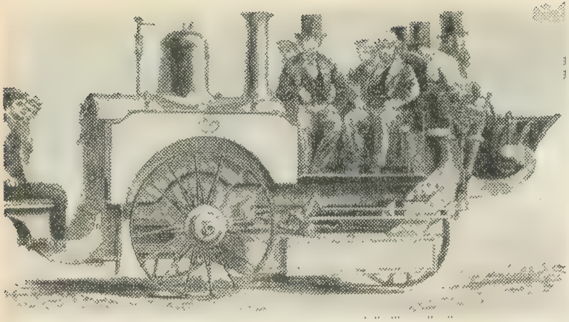
Another interesting, but little known steam road vehicle was Perry Dickson's, which had a unique method of transmission that was



Above: Section and details of the rod-link drive of the Dickson steam driven road carriage



Right: The Dickson steam carriage was built in Pennsylvania, USA, in 1865



Left: The steam vehicle built by W. O. Carrett 95 *years ago*

Below: The Rickett's road steamer of 1860

1840 to about 1895 provides very little of importance to chronicle, governmental road restrictions and prohibitive road tolls effectively hindering progress in any direction. Mention may, however, be made of H. P. Holt's vehicle of 1866-67, which had some claim to originality.

In this machine, which was built near Leeds, a single wheel was used in front and two driven wheels at the rear. The frame or chassis was constructed of bent angle-iron and there was a single seat above the front steering wheel; a back-to-back

patented by him at Erie, Pennsylvania, in 1865. Previously, however, in the United States, self-propelled steam vehicles had been designed and built by Lee and Larned, and Latti and Cincinnati, while Richard Dudgeon, of New York, also built a carriage which ran in that city and ended its days by being destroyed by fire at the Crystal Palace, England. S. H. Roper, of Boston, also designed a steamer, which weighed 450 lb.

But it is the originality of the Dickson vehicle which claims our attention. The single cylinder *A* was attached to the mainframe and oscillated thereon, the piston rod *B* connecting to a rocking quadrant *C* fitted with a sliding head *E* to which the connecting-rod *F* was jointed to give motion to a transverse rockshaft from which a main rod *H* was taken to the driving-wheels crank.

The sliding head was fitted with a rack *G* by which it was raised or lowered as desired on the quadrant, suitable means being provided for retaining the head in whatever working position it was placed; the means referred to being the pinion *J*, and gears.

Reversing was obtained by throwing either set of toggle-jointed arms in or out of grip with the driving wheels, so that when the sliding head was moved until it was in line with the rocking-shaft, it was then at the point of no motion, but the engine still ran while the vehicle remained stationary; so the engine could be used for pumping and other farm work without any alterations of any kind.

Then there was the ponderous steam carriage, designed by Mr Rickett, of Castle Foundry, Buckingham, which was built in 1860 and shown personally to Queen Victoria, Prince Albert, and other members of the Royal Family at Windsor Castle.

This massively-built "private carriage" had ample room for three persons in front and for a stoker at the rear, being designed to run at an average speed of 10 m.p.h.—though a top speed of 16 m.p.h. was recorded on a "good" road of those days on one occasion. It was gear-driven, the lower gear multiplying the 10 h.p. of the pair of $3\frac{1}{2}$ in. $\times$ 7 in. cylinders by two and a half times, and working thus, it could climb with full load a gradient of 1 in 10 at a speed of 10 m.p.h.

The engine itself was built upon a 90 gal. tank, which formed a strong tubular framework, the boiler being placed above and the whole of the machinery being entirely protected from dust and grit by being contained in the space between the tank and the boiler. The latter was made of steel and so constructed that variations of level did not uncover the firebox crown, while a working pressure of 170 p.s.i. was maintained therein.

About a gallon and a half of water was evaporated per minute and from eight to ten lb. of coal was used per mile.

The weight of the vehicle was $2\frac{1}{2}$ tons, of which the engine and carriage was responsible for 30 cwt, the water, 12 cwt, the coal, 3 cwt, and the passengers, 5 cwt. Other similar vehicles were made at Buckingham, and the prototype was later taken to Belgium.

The useful history of the development of the "lighter" and "faster" type of mechanically-propelled road vehicle in England from the year

transverse seat in the centre and a vertical boiler with Field-type tubes at the rear. The driving wheels were suspended upon semi-elliptic leaf springs attached to the chassis.

Fixed to the frame, beneath the centre seat, were two separate transverse crankshafts in line, each having two cranks at 90 deg. to each other. There were four inclined small cylinders to drive the cranks, but it was only necessary to use one pair when driving on a good level road. All this arrangement was almost exactly similar to W. H. James's Birmingham effort of 1824—some forty years earlier !

The exhaust passed into a cast-iron box fitted with baffles from which the superheated steam issued by five jets almost noiselessly and completely invisibly. On the outer ends of the two crankshafts were chains which transmitted the drive direct to sprockets on the rear wheels with a 3 to 1 reduction, no clutches being used.

The front wheel was supported by a turntable connected by rod linkage to a vertical steering column. The total weight of the vehicle was $1\frac{1}{2}$ tons; speeds of from 15 to 20 m.p.h. could be obtained on a good road; sufficient coke for 40 miles and water for half that distance could be carried. ■

LOCOMOTIVES I HAVE KNOWN

Number 42 by J. N. Maskelyne

IN January, 1905, Mr D. E. Marsh was appointed Locomotive Superintendent at Brighton in succession to Robt J. Billinton, who had died in the previous November. Unlike his predecessor, Mr Marsh designed a new class of express passenger engine which appeared to be far larger than was required for any traffic that the old Brighton Railway was operating.

Mr Marsh's previous job had been that of chief assistant to Mr H. A. Ivatt, at Doncaster on the Great Northern Railway, and his first design for the Brighton was, apart from a distinctly Brightonian chimney, cab and tender, practically identical with Mr Ivatt's large-boilered Atlantics for the GNR.

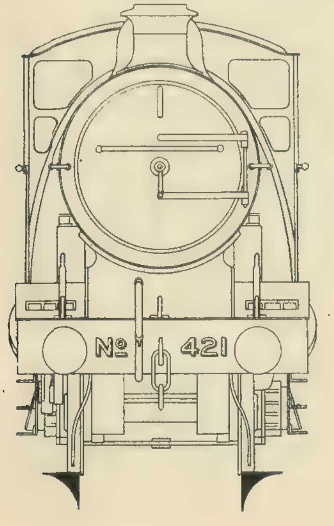
Five of the new engines, built by Kitson and Co. of Leeds, were delivered to the LBSCR between December 1905 and February 1906. They created quite a sensation, and the first reaction of Brighton enthusiasts was: What on earth can the Brighton line find for such engines to do? The engines themselves soon supplied the answer to that question; for it was found that they were capable of keeping time on the best and fastest trains, with the loads augmented by anything up to about 200 tons. They were designated Class H1.

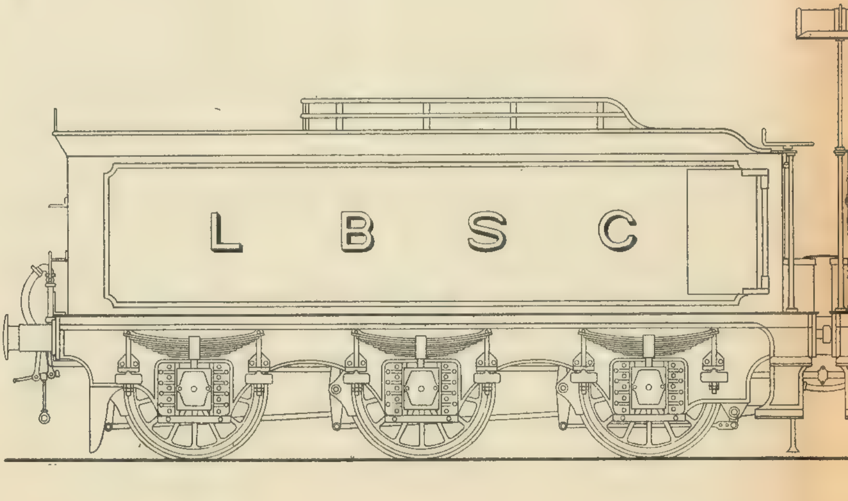
Five years later, in 1910, an order was placed in the Brighton Works for a further six of these engines. Mr Marsh, however, retired at the the end of that year and was succeeded by Lawson B. Billinton, son of Robt J., who assumed office under the title of Chief Mechanical Engineer, and was the first and last officer of that title on the LBSCR. Work on the new Atlantics was temporarily suspended while Billinton ran his eye, so to speak, over the Marsh design. He tidied up the external details somewhat, by substituting a chimney of his own design, extending the cab roof by about 15 in. to the rear of the pillars, and, more particularly, smoothing out the run of the footplating which, in the Marsh engines, contrived to reach five different levels in its progress from front to back of the engine! Billinton's footplating reached only three, and, being continuous, the effect was much more pleasing.

The construction of the new engines was resumed, and the opportunity was taken of providing them with superheaters, which the earlier engines had lacked. These six engines were Class H2; they were numbered 421 to 426, and the first one has been taken as the subject of my drawing. She is seen to be not quite in her original condition; in 1911, she had been turned out with brakes on the bogie, and with a small steam cylinder mounted on the side of the smokebox, for the purpose of operating dampers for

The Brighton

the superheater. I have shown her as she was when I got to know her really well about 1919, by which time the bothersome bogie brakes and superheater dampers had long since been discarded—which is just as well, because those two monograms with which her splashers were adorned have given me trouble enough in drawing! They were later replaced by coats-of-arms.





The following dimensions were common to both classes H1 and H2: The wheel diameters were: bogie and trailing, 3 ft 6 in.; coupled, 6 ft 7½ in.; wheelbase, 6 ft 3 in. plus 5 ft 3 in. plus 6 ft 10 in. plus 8 ft, totalling 26 ft 4 in. The overhang was 2 ft 6½ in. at the front and 5 ft 7 in. at the back. The boiler was pitched 8 ft 8½ in. above rail level; the barrel was made in two rings, the larger of which was 5 ft 6 in. outside diameter; the barrel length was 16 ft 3⅞ in. The firebox was 6 ft 9¾ in. long and 5 ft 11 in. wide outside, and the grate area was 30.9 sq. ft.

The tender was carried on six wheels, 3 ft 9 in. diameter, the wheelbase being the usual 13 ft equally divided; its overhang was 4 ft 10 in. in front and 3 ft 10½ in. at the back. The capacity was for 4 tons of coal and 3,500 gallons of water, and the weight in working trim was 29 tons 10 cwt. The total length of engine and tender over buffers was 59 ft 9 in.

The variable dimensions, as between

ATLANTICS

the two classes, are best given separately. For Class H1, the boiler contained 248 tubes, 2¼ in. dia.; they were of steel, but each had a length of 6 in. of copper welded on at the firebox end, to forestall any possible electrolitic action between the steel tubes and the copper firebox tubeplate. The total heating surface was 2,473.5 sq. ft, the tubes accounting for 2,337.1 sq. ft and the firebox for 136.4 sq. ft. The working pressure was 200 p.s.i.

The engine weighed 68 tons 10 cwt, distributed thus: 16 tons 5 cwt on the bogie, 38 tons 10 cwt equally divided between the coupled wheels, and 13 tons 15 cwt on the trailing wheels.

For Class H2, the boiler contained 143 tubes of 2¼ in. dia. and 24 superheater flues of 5½ in. dia., the heating surfaces of which were 1,348 and 547 sq. ft, respectively. The heating surface of the firebox was as before, 136 sq. ft, so the total amounted to 2,031 sq. ft. The working pressure was 170 p.s.i.

The cylinders were 21 in. dia., 26 in. stroke and had 10 in. piston valves operated, as before, by Stephenson link-motion arranged to give a travel of 4$\frac{11}{16}$ in. The weight of the engine remained unaltered at 68 tons 10 cwt, but the distribution was now 17 tons 10 cwt on the bogie, 37 tons 10 cwt on the coupled wheels and 13 tons 10 cwt on the trailing wheels.

These fine, big, bold, smooth-surfaced locomotives greatly appealed to me, right from the beginning. Eventually, however, they achieved rather a melancholy record; for they were the last Atlantics to be designed for a British railway, the last and only express passenger tender engines designed by Mr Marsh, and No 424, as British Railways No 32424, *Beachy Head*, was the last Atlantic to run in Britain.

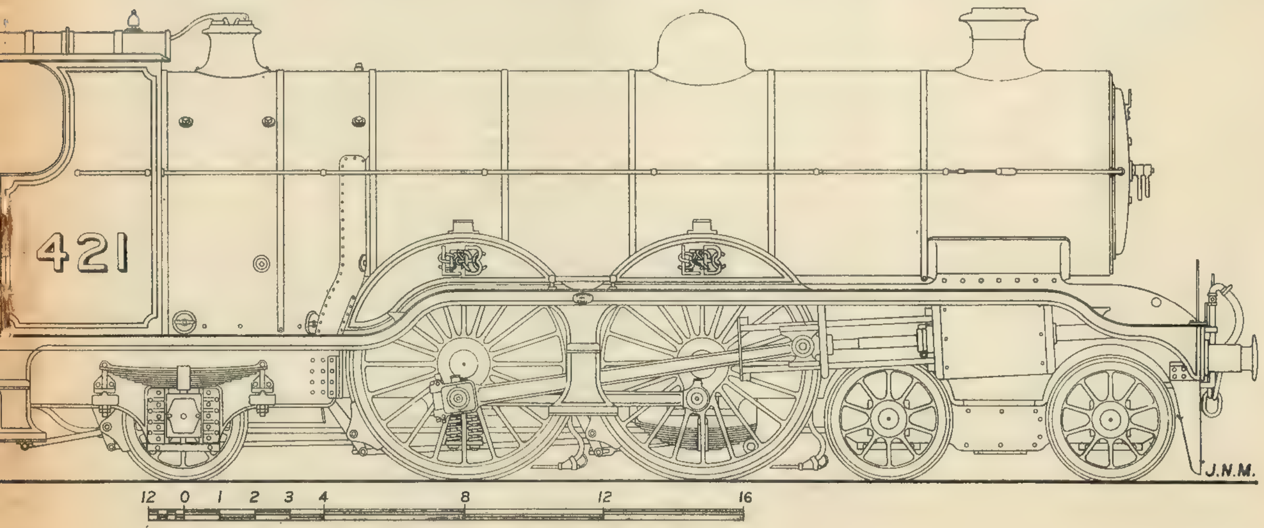
The work of these engines was always good, but I feel that, on a line like the LBSCR, they had no chance to show what they really could do, and it is a pity that there was never any opportunity to arrange an exchange-trial between an H2 and one of her ever-celebrated Great Northern sisters.

No 39, of Class H1, seemed to carry off most of the honours won by these engines. On Sunday, 30 June 1907, she made a splendid run from Victoria to Brighton with the Pullman Limited made up of five 8-wheeled and two 12-wheeled cars plus two 6-wheeled Pullman "Pups," totalling about 245 tons. In spite of severe checks near Earlswood, due to widening of the line being then in progress, she ran the 50½ miles in 51 min. 48 sec., start to stop, reaching a maximum speed of 86½ m.p.h. between Balcombe and Wivelsfield.

On 1 November 1908, the same engine was used to work the inaugural trip of that most-beloved, luxurious and ever-popular all-Pullman train, the Southern Belle, and she was often to be seen on it for many years afterwards. In those days, the "Belle" was a train well worth seeing and travelling in; its successor, the present-day "electric 'Belle'" is a mere travesty!

In 1909, No 39 was honoured by being given a name, *La France*, for working the special train which conveyed M. Raymond Poincaré, President of France, on a State visit to London. No 39 retained her name until 1923, and for several years, was always used for any Royal specials on the LBSCR.

No 421, of Class H2, ran for about three years, after she first took the road in July 1911, painted dove-grey picked out with black bands and white lining; she looked very well like that, but was subsequently repainted in the standard umber livery. But no matter what they were painted, they were all grand engines that I was pleased to know. In 1923, the Southern Railway named all these Atlantics after south-coast headlands. ■

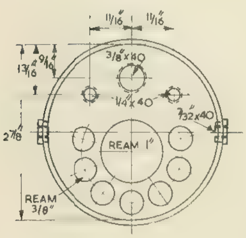


ZOE

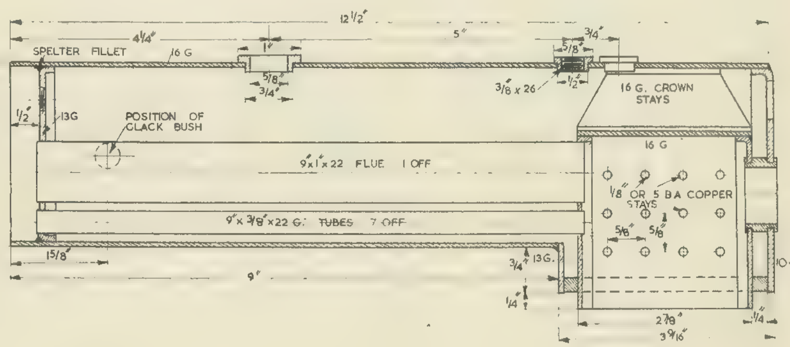
Continued from 29 August 1957, pages 304 to 306

Having described the working parts of the 1¾ in. passenger hauler, LBSC now gives instructions for building a boiler to raise steam for it.

The boiler for this locomotive is of the same design as that on my old veteran *Ayesha* which has been tried, tested, and certainly not found wanting ! It also incorporates one important improvement. My experience over many years with these small locomotives is that, provided the lubrication is effective and reliable, you can't have the steam *too* hot—within reason, of course—and so I am specifying a superheater with twice the effective heating surface as the one fitted to *Ayesha*.



Smokebox tubeplate



Longitudinal section of boiler

When scheming out the boiler for my 2½ in. gauge 2-8-2 *Cock-o'-the-North* I found that a better arrangement of tubes could be got into the space available if I used one big flue with twin elements, than if two smaller ones with single elements were used. I built the boiler accordingly. It was a great success and so I am adopting the same arrangement for *Zoe's* boiler.

For the barrel and firebox wrapper, which are in one piece, a piece of 16 gauge seamless copper tube 3 in. dia. will be required. This should be long enough to finish to 12½ in. in length after the ends have been faced off square in the lathe. At 3½ in. from one end, make a sawcut with a fine-toothed hacksaw halfway across. Take care to keep the cut exactly at right angles to the tube. Then saw down longitudinally from the end, to meet the cross cut, and see that the two cuts are exactly at right angles. The longitudinal cut should meet the cross cut precisely in the middle.

Soften the embryo boiler shell by heating the sawn end to red and plunging into clean cold water. Open out the cut portions until they assume the shape shown in the cross section through the firebox· If the sawn edges are very ragged, smooth them off with a file.

To flange up the throatplate you will need the backhead former, so make this next, cutting it from a piece of iron or steel plate about ¼ in. thick. The dimensions are given in the drawing of the backhead, and if a blade is used with 18 or 22 teeth per inch, the sawing will be quite easy. Apply some cutting oil, as used for turning steel, to the blade. If you haven't any, use soapy water, which is a good substitute. Smooth off the sawmarks with a file and round off the edge on one side of the plate.

Cut a piece of 13 gauge (3/32 in.) sheet copper to the shape of the throatplate, allowing an extra ⅜ in. at each side for the flanges. Grip this in the bench vice alongside the former, flush with the bottom, and beat down the sides of the plate over the edge of the former. Clean the flanges with a coarse file after forming them. Mark off the semicircular opening, and cut out the segment with a piercing saw, which is just a fretsaw frame with a metal-cutting blade in it.

Insert the throatplate in the gap under the barrel. To get the bottom of it level with the bottom edge of the shell, the upper part of the flanges must be bent inwards a little. They should overlap the sawcuts. Make sure that the throatplate butts up tightly against the sawn end of the barrel, then rivet the flanges to the opened-out sides of the wrapper. Three 3/32 in. copper rivets at each side will be sufficient to hold the throatplate in position while being brazed in.

The brazing on this small boiler is very easy, and a 2½ pint paraffin blowlamp or its equivalent in gas blowpipes will provide sufficient heat with coke packing. A bigger one naturally will do the job quicker. Cover the joints at each side, and under the barrel, with a good coating of wet flux. Boron compo, mixed to a paste with water, is very good for use with easy-running brazing strip.

Stand the shell on end barrel upwards, in a pan of small coke or breeze, pile some up inside to within 1 in. of the throatplate, and outside to the level of the throatplate. Heat

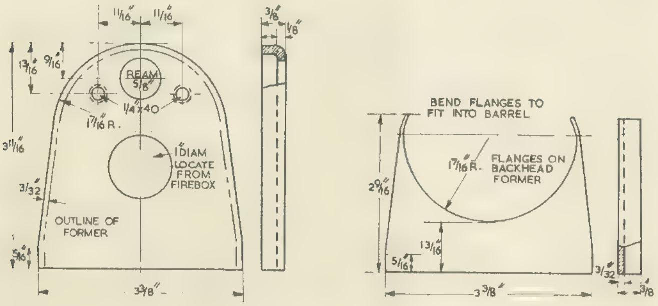
evenly until the coke starts to glow red, then direct the flame on to one bottom corner. When that becomes bright red, apply the strip of brazing material. If the heat is sufficient, it will melt and flow into the joint.

Move the flame slowly along, feeding in more brazing strip which should be frequently dipped in the flux. When reaching the end of the sawcut, take care to feed in enough brazing material to seal it well and truly. Then go along the joint between barrel and throatplate, feeding in enough brazing strip to form a nice fillet. Stop when you reach the other end, and restart from the bottom of the second side. When the end of the sawcut is reached, play the flame on the joint long enough to allow the brazing strip to form a perfect seal.

If an oxy-coal or oxy-acetylene blowpipe is available, use Sifbronze No 1 and the special flux sold for use with it. The job is then easier than soft soldering, and will come out neat and clean. I find it so, anyway. Beginners can, if they wish, use coarse-grade silver solder, which requires less heat. Either Boron compo or powdered borax mixed with water to a paste will be suitable for flux.

Let the job cool to black, then immerse it in a pickle bath. This is simply a lead or earthenware container in which is a solution made by adding one part of commercial sulphuric acid to about 16 of water. Leave it in for about 20 min. then well wash in running water and clean up with a handful of steel wool or domestic scouring powder. Never handle dirty copper if you can avoid it.

I have dilated on the above brazing job for the benefit of beginners. All the rest of the brazing jobs are done in similar fashion and there is nothing to be afraid of in any of them. Use a small pair of blacksmith's tongs for handling the boiler when hot, and stand well clear of splashes from the acid pickle.



Backhead and throatplate

FIREBOX AND TUBES

Cut out the firebox former from $\frac{1}{4}$ in. plate to size as shown, and drill the holes for locating tubes. Lay it on a piece of 16 gauge sheet copper and draw a line all around except at bottom, at a full $\frac{1}{4}$ in. from the edge. Cut out the piece of copper and repeat the operation. Clamp one alongside the former in the bench vice, flange over the edges, and before removing the flanged plate from the former, run a No 30 drill through all the holes and through the copper plate. File off any ragged edges. Open out the middle hole with a 63/64 in. drill and ream 1 in. If you don't happen to have a drill and reamer of this size, just drill the hole with the biggest available, and open it out with a half-round file until a 1 in. tube will fit tightly. Open out the other holes with 23/64 in. drill and ream $\frac{3}{8}$ in. but only enter the reamer a very little, so that the tubes will fit tightly. Countersink all the holes on the side of the plate opposite to the flange.

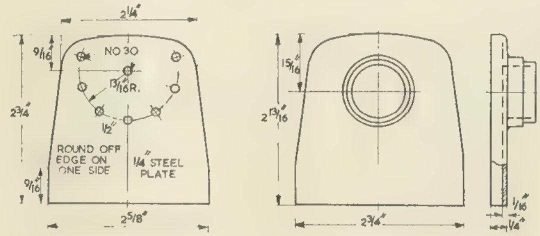
Flange the other plate, then drill a No 30 hole at $\frac{15}{16}$ in. from the top. Open out to 1 in. for the firehole ring. To make this, chuck a piece of $1\frac{1}{8}$ in. $\times$ $\frac{1}{8}$ in. copper tube, face the end and turn down $\frac{3}{16}$ in. length to 1 in. dia. parting off at $\frac{7}{16}$ in. from the shoulder. Reverse in chuck and turn $\frac{3}{16}$ in. of the other end to 1 in. dia., then soften the ring by heating to red and plunging into cold water.

Clean it up, then push one of the flanges through the hole in the doorplate from the side opposite flange. Beat the projecting piece of the ring outward and downward on to the plate, so that the ring is clamped tightly to it.

If any builder prefers an oval firehole, the ring can be squeezed to an oval shape in the bench vice, and the hole in the doorplate cut to suit it. I specified a round one by way of variety as many full-size locomotives have them.

Cut a piece of 16 gauge sheet copper $7\frac{3}{4}$ in. long and $2\frac{7}{8}$ in. wide, bend to shape shown in the cross-section, and fit the two firebox plates into it, fixing by $\frac{1}{16}$ in. copper rivets at about 1 in. centres, to hold the parts together while brazing. Cut the two crown stays from similar copper to size and shape shown, and rivet them to the crown of the firebox with 3/32 in. rivets, the stays being set $\frac{7}{8}$ in. apart.

Cover the joints with wet flux putting plenty along both sides of the crownstay flanges. Stand the firebox in the coke with the doorplate uppermost, then braze in the plate in the same way as the throatplate, starting at one bottom corner and going right around. Run a fillet of brazing material all around the ring. Turn the firebox over and repeat operation on the tubeplate end but take care to avoid burning out the metal between the small holes and the large one, otherwise the ceremony of making up the tubeplate and fitting it will have to be repeated. Sheer waste o' guid material, ye ken! Use coarse-grade silver solder for the crownstay flanges.



Left: Firebox former and tubehole jig. Right: Firebox doorplate

One 1 in. $\times$ 20 gauge flue and seven

ZOE . . .

continued

3/8 in. × 22 gauge tubes are required. Square off the ends in the lathe to 9 in. length and clean them with emerycloth while revolving. They should fit tightly in the holes in the firebox tubeplate and project a bare 1/16 in.

SMOKEBOX TUBEPLATE

Cut out a disc of copper 3½ in. dia. and 3/32 in. thick. Flange it over a circular former a bare 2¾ in. dia. I use old wheel castings or anything that happens to be handy for this kind of job. Face off any raggedness in the lathe, then hold the plate by the inside of the flange over the chuck jaws and turn the flange to a tight push fit in the boiler barrel.

Clamp the firebox former to the plate with the lowest of the tube-locating holes 5/16 in. from the edge, then put a No 30 drill through the lot. Open them out just the same as those in the firebox tubeplate but put the reamer well in, as the tubes should fit easily at this end. Countersink slightly on both sides. Drill and tap the stay and steampipe holes as shown on the drawing.

Put the tubeplate on the ends of the tubes to act as support and spacer while silver soldering the tubes into the firebox. Adjust the nest of tubes so that they line up with the firebox sides and are square with the tubeplate. Stand the assembly in the coke with the tubes pointing skywards. Put plenty of wet flux all around each tube. Pile up the coke inside the box almost to the tube level, and around the outside also.

Heat the tubeplate first, blowing the flame partly outside and partly inside the firebox, then when the flux has fused, direct the flame on the tubes as well. As soon as they attain dull red temperature touch each with a strip of best-grade silver solder or Easyflo. If the heat is right this will immediately melt and flash around each tube like water. As there are only a small number of tubes the lot can be done at the one heating.

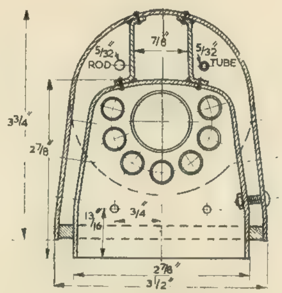
Pull off the smokebox tubeplate and heat the ends of the tubes to red, then put the lot in the pickle, after which wash and clean up ready for assembly into the shell.

ASSEMBLY

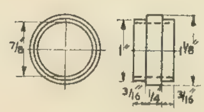
Clean around the inside of the end of the barrel, wrapper and bottom of firebox with coarse emerycloth. Cut a piece of ½ in. square copper rod to fit tightly between the flanges at the bottom of the throatplate. Lay the shell on its back and slide the firebox-and-tube assembly into it, until the firebox tubeplate touches the bit of square rod. Adjust the firebox so that it is central with the shell and put a toolmaker's cramp over the throatplate and firebox tubeplate to hold it there.

The crownstay flanges should touch the top of the wrapper for their full length. Put a cramp over wrapper and flange to hold them temporarily, then drill three No 41 holes through the wrapper and each flange, and put 3/32 in. copper rivets in as shown in the cross section. Put four more through the bottom of the throatplate, piece of square rod, and bottom of the firebox tubeplate.

Put the smokebox tubeplate in the barrel flange first. Carefully drive it in until it almost touches the tubes,



Section through firebox



Firehole ring

then line them up with the holes with a wooden skewer or a pencil. Drive the tubeplate in a little more until the tubes come through the holes about 1/16 in. and the tubeplate lies level in the end of the barrel. Expand the tube ends into the holes by driving a tapered piece of metal (such as a drill shank) into each. If greased it will come out easily.

NEXT BRAZING JOB

A tray of some sort (a big tin lid would do) will be required to hold coke for the tubeplate brazing job. Cut a hole in it the size of the barrel and put it over the barrel about 3 in. down. Stand the boiler on end and prop up the tray with a couple of bricks or anything else available so that it won't slip. Put some coke around the barrel, and plenty of wet flux around the tube ends and the edge of the tubeplate.

Heat up the whole lot, and when the coke glows red, concentrate the flame on one point of the circumference. When that glows red too, apply a strip of coarse-grade silver solder and work your way right around, moving the flame very slowly and feeding in the silver solder as the metal reaches the right temperature. Then play on the end of each tube, using best-grade silver solder. To protect the tubes from overheating (the thin metal is more likely to burn than the thick tube plate) put a wad of asbestos string or flock in the end of each, about ⅛ in. down.

When all the tubes are done, transfer the boiler to the brazing pan as quickly as you can, setting it with the firebox upside down and overhanging the edge. Put plenty of wet flux all along each side of each crownstay flange where it is attached to the wrapper, and lay a strip of coarse-grade silver solder in the flux. Put a weight of some sort on the barrel to prevent the whole bag of tricks tipping up just as it has got nice and hot!

Heat up by blowing the flame partly inside and partly outside, and when the flux has fused and run into the joints direct the flame full blast on the outside of the wrapper opposite one of the flanges. When the metal reaches bright red the strip of silver solder will melt and sweat through between flange and wrapper, sealing the rivets and making a good joint. Give the other flange a dose of the same medicine then let the job cool to black, after which it can be put in the pickle for the usual 20 min. or so. Note, however, that the boiler is now becoming rather weighty, so take care that it doesn't slip while being immersed. I usually hold a boiler of this size on the end of the garden rake, and stand well clear of the splashes.

After pickling, wash the boiler well in running water and clean up the metal ready for the final job, fitting backhead, foundation ring, and brazing them in.

● *To be continued*

EDGAR T. WESTBURY discusses a new type of bearing unit which has many applications in the model engineer's workshop

Self-contained bearing assemblies

UNLESS one is sufficiently wealthy to be able to obtain every item of workshop equipment ready-made and ready-to-use without installation problems (a rare condition, I imagine, among model engineers) the need to build, adapt or improvise appliances involving bearings arises in every workshop sooner or later. Even apart from considerations of expense, occasions arise where the only way to achieve a desired result is to do it yourself, and in any case there is a good deal of satisfaction to be derived in the process.

All kinds of running machinery depend primarily on bearings, and they are of paramount importance in the success and efficiency of every mechanical scheme. If it becomes necessary to fit up a lineshaft or countershaft to transmit power to machine tools from a motor or other source of power, bearings of some kind must be used, and the same applies in fitting up a grinding and polishing head, a drilling or milling spindle, or anything of a like nature.

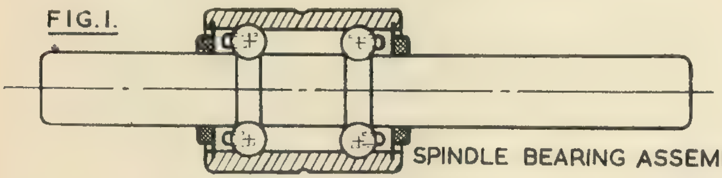
Bearings of a simple or even crude type may be found quite suitable for certain jobs; shafts have been run for years in holes drilled through blocks of wood, or even open-topped recesses in this material, and in bearings formed of short lengths of metal tube. The standard ready-made bearings for power shafting are usually of the plummer block or swivelling self-aligning bush type, but ball-bearings or roller-bearings have also been adopted extensively for this purpose. Wooden blocks bored and recessed to form housings for ball races are by no means an uncommon expedient in small workshop installations.

The convenience of a form of bearing unit which can be applied to many purposes, however, is beyond question, and the object of this article is to bring to the notice of readers a new self-contained bearing which has been introduced by the Fischer Bearing Co. Ltd, of Wolverhampton (Fig. 1). It is intended primarily as a component for assembly in automobile engines, where it can be used for the water circulation pump, fan, or dynamo drive, but it is obviously just as readily applicable to many other purposes, and I have experimented with it for use in workshop appliances, with great success.

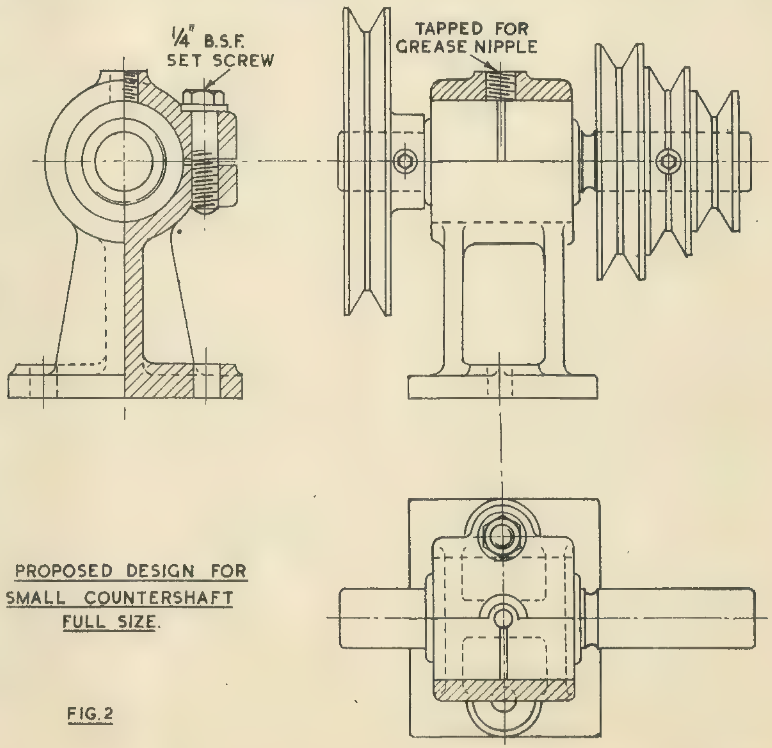
The bearing unit is made in several types, varying to some extent in size and detail of design, but all have the same basic features, incorporating a shaft extended either at one or both ends from the housing or " quill," and having two grooves which form the inner ball races, corresponding with similar grooves in the housing which form the outer races.

These constitute, in effect, two complete single-row deep-groove ball-bearings, but are much smaller and more compact, by the elimination of the inner races, which are essential when fitting a separate shaft in the normal way. The grooves are suffi-

FIG. I.



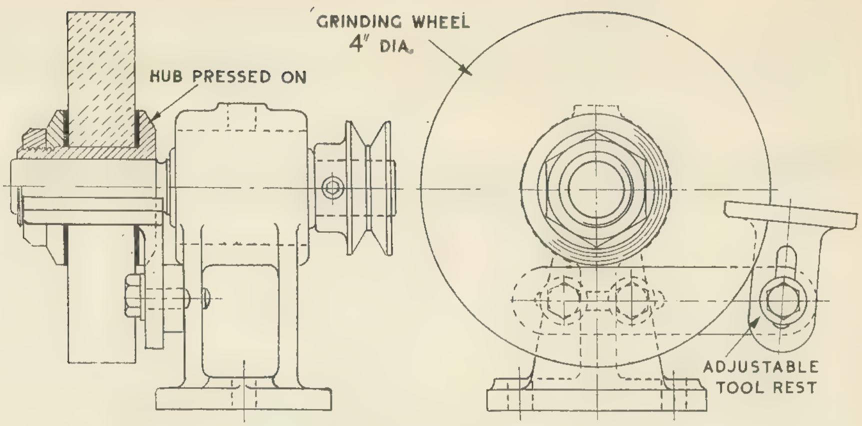
SPINDLE BEARING ASSEMBLY



PROPOSED DESIGN FOR SMALL COUNTERSHAFT FULL SIZE.

FIG. 2

Self-contained bearing assemblies —*continued*



SINGLE-ENDED TOOL GRINDER

FIG. 3

ciently wide apart to give adequate support to the shaft against overhanging load, and provide a complete answer to the problems of spacing and relative end-location, which arise when fitting bearings of the usual type in the orthodox way.

On account of the small diameter of the grooved shaft, the rolling speed of the balls in the races is low in relation to the r.p.m. of the shaft, so that the latter can be run at very high speed without excessive centrifugal loading of the balls against the outer races, or skidding due to inertia if rapid changes of speed take place. The balls are spaced by metal cages, and dust seals are fitted to the ends of the housing, which has a central aperture for the injection of grease.

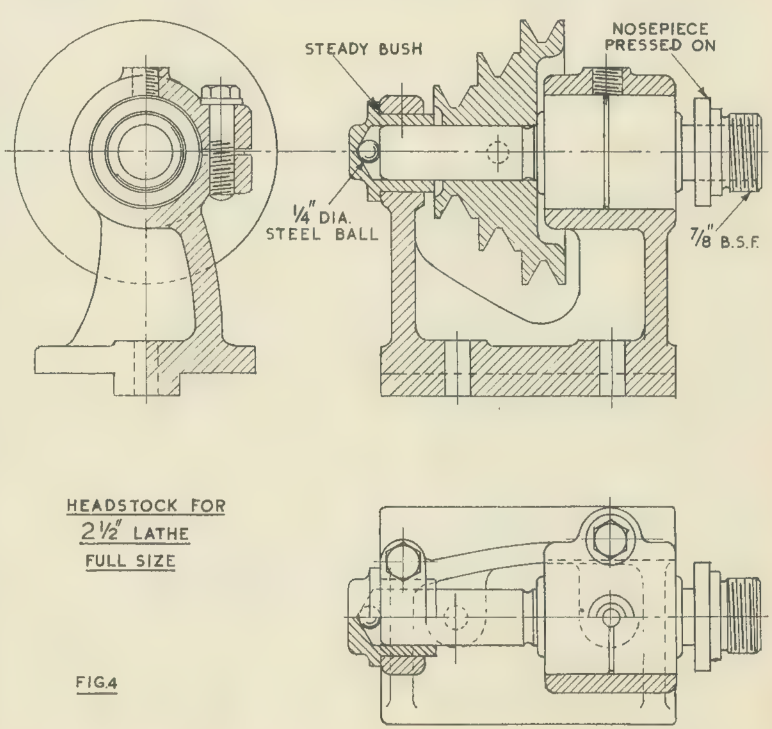
One of the simplest, and also most common, applications of the bearing unit in the workshop is in the construction of a light countershaft for driving a lathe or other machine. A suggested design for this is shown in Fig. 2, where a simple casting in light alloy is used to carry the bearing, though the form is capable of modification to suit requirements, or, alternatively, a fabricated or machined-from-solid standard may be used.

It will be seen that the housing is simply bored to a push fit for the bearing quill, and split to take a clamp bolt. The underside of the foot may possibly need machining, but, in most cases, fettling with a file will be sufficient if it is to be mounted on a wooden bench. Drilling and tapping for a grease nipple is an optional refinement, as the original grease packing of the bearing will provide sufficient lubrication for a long time.

The nipple, or a plain setscrew, may be shouldered down at the end to locate in the hole in the bearing, and this would be sufficient to hold it in position as an alternative to the split clamp, but the latter is preferable, and in any case it is important that the screw or nipple should not bear on the bearing quill for securing it.

The pulleys fitted to the two ends of the shaft are, of course, of a size and type to suit the primary and secondary drives, and commercially-produced pulleys are available in a fairly wide range. Sunk Allen grub-screws are recommended for securing them to the shaft, and, as the latter is hardened in some types, it may be found desirable to grind a flat on it to provide a positive drive, immune from slipping.

The same casting can be used for several other purposes, including a single-ended tool grinder or polishing head (Fig. 3). In order to mount an abrasive wheel securely and safely, it is necessary to provide a flanged hub, screwed at the end to take a clamping nut and loose flange. This can be made in an integral unit, bored to press tightly on the shaft. About 0.001 in. interference should be allowed, and if the bore is lapped out slightly at the entry end, and lubricated with tallow, it can be pressed on quite easily with the aid of a large vice or mandrel press, but will be firm and secure when in position.



HEADSTOCK FOR
2 1/2" LATHE
FULL SIZE

FIG. 4

One accessory which I consider absolutely essential to a tool grinder is an adjustable tool rest. The one shown in Fig. 3 is made in two pieces, namely, a horizontal support bar of $\frac{3}{4}$ in. × $\frac{1}{4}$ in. rectangular steel bar, slotted to provide cross adjustment and secured to the side web of the standard by two setscrews or studs, $\frac{1}{4}$ in. dia.; and a flat-topped angle bracket, clamped to the side of the support bar by a single $\frac{1}{4}$ in. setscrew, with a slot to allow both vertical and angular adjustment. This component may be built up, or it could be cut from a short piece of $1\frac{3}{4}$ in. × $1\frac{3}{4}$ in. angle steel.

This simple tool rest gives a far better range of adjustment than that fitted to most commercial tool grinders including some quite expensive ones; it is intended for grinding tools on the crown of the wheel, which is the most efficient method for many types of lathe tools. If, however, the concave or "hollow-ground" surface is unsuitable, the rest can be modified to provide side angle adjustment, though ordinary grinding wheels are not recommended for this kind of work unless specially dressed, and maintained in proper shape. The bearing will, however, withstand the end thrust produced by side grinding better than most types of plain bearings.

Bearing units of this type are not designed for such duties as lathe or milling spindles, though they can be made to serve for light and not very exacting work of this nature. The standard shown in Fig. 2 could be used for a small wood-turning lathe headstock, but for accurate metal work it is desirable to provide extra steadying support for the tail end of the spindle, and also some means of positively eliminating any end play. This can be done in a simple manner, as shown in Fig. 4, by providing a bronze bush to fit the end of the shaft, and a steel ball to take end thrust.

The use of a blind-ended bush simplifies construction, but a separate end plate to take the ball, or a complete ball thrust race, would be a desirable refinement. End play is taken up by pushing the bronze bush right home, and pressing the bearing quill towards it as far as it will go before clamping it in the housing.

The cone pulley must, of course, be fitted between the housings before the shaft is inserted, and the space available must be arranged so that it can just be "wangled" into position. If a screwed mandrel nose is required, it can be pressed on in the same way as the hub sleeve of the grinder. Although the surface of the shaft is hardened, a socket for a live centre could be bored if the end face is ground away for about 1/32 in.

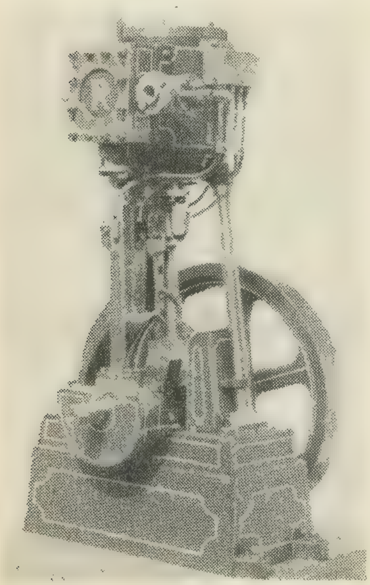
Lathe headstocks are usually secured to the bed by bolts or studs near the centre line, and it is common to provide a tongue or aligning strip on the underside to fit between the shears of the bed. This is provided for in the headstock casting shown in Fig. 4; the strip may be made separately and attached by screws and register dowels if desired. With the holding-down bolts in the centre, the stiffening web between the bearing housings must be offset, and it is also shown laterally and vertically curved to provide maximum rigidity; there is, however, a good deal of latitude permissible in these details of design.

These examples illustrate just a few of the ways in which the bearing assemblies can be usefully employed; other applications which will occur to readers are in circular saws, moulding spindles and routers, drilling fixtures, etc.

It is expected that by the time this article is published, retail supplies of the bearings, in one or more forms best suited to these particular requirements, will be available to readers through ME trade advertisers. The cost of the assemblies is moderate. ■

ONE I BUILT, THE OTHER I REBUILT

On the left is a Stuart Turner No 2 vertical which I built, with additions. It has spent many hours running on air at North East exhibitions. At 3 p.s.i. she runs at a steady 60 to 70 revs. The cut-off is fairly late to ensure slow running on low air pressures for exhibition purposes. The engine was never intended to run continuously on steam.



The engine on the right, 2 in. bore × $3\frac{1}{2}$ in. stroke, is a rebuild. I saw the rusty bits with broken cast-iron column in a shop and procured them.

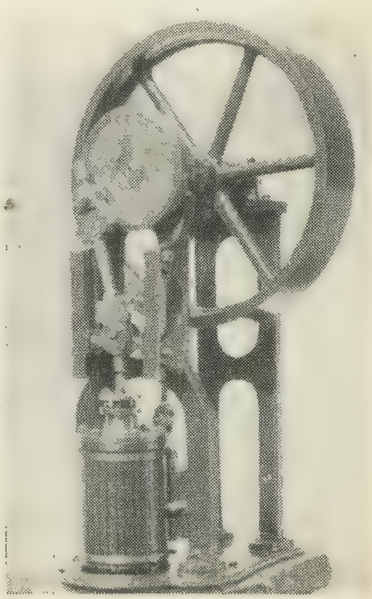
By T. Richwood

The right-hand leg of the front column had a piece missing, about 1 in. long. A piece of cast iron was filed to shape and brazed in. The flywheel, 10 in. dia. × $1\frac{1}{4}$ in. face, has a cut through the rim.

Careful inspection with a magnifying glass shows that this slot was not made with a cutting tool but has probably been cast in by putting a "chill" in the mould.

The engine, when procured, had a varied assortment of roughly made square nuts holding the cylinder cover and steamchest. Most of the original engine is still there—I repaired the column, fitted new steamchest, valve, and valve rod.

The photographs were taken by S. G. Dumper, of Chingford. ■



NEW TRACK AT NOTTINGHAM

Northerner reports on the official opening by the Lord Mayor

The Lord Mayor listens attentively as T. B. Glover explains points of interest about his Indian State Railways tank locomotive

Rising young engineman, Robert, helps his father, R. J. Davison, to raise steam in the latter's LBSC-designed Pacific PAMELA

FOR nearly thirty years, ever since the Nottingham SMEE was founded, the members have had ambitions to possess their own permanent track. Like many other clubs, however, they found the problem was to obtain a suitable site at a suitable figure.

In 1956, thanks to a progressive local Corporation and especially to the Parks Committee, the club acquired a magnificent site on Valley Road, even possessing as one boundary a stream of limpid water which is ideal for locomotive boilers !

Stan Wright is the member who, as supervisor, planned the track and was the main stay behind its construction. It is 840 ft long, with $2\frac{1}{2}$ in., $3\frac{1}{2}$ in. and 5 in. gauges, and building it involved casting 140 concrete supports, cutting 3,000 sleepers, and screwing home nearly 6,000 screws, among much other work. A sectional timber club house 24 ft $\times$ 12 ft was also erected.

The official opening ceremony was performed recently by the Lord Mayor of Nottingham, Councillor Hickling, who, after a suitable speech, was driven round by Stan on his $3\frac{1}{2}$ in. Pacific *Great Northern* to break a ribbon stretched across the track.

Subsequently the Lord Mayor was seen taking a lively interest in the other locomotives on the steaming bays, and also in the operation of raising steam.

T. B. Glover, the society's energetic secretary, had three of his engines present, two of them being well known to thousands of men in the Services. His *Maisie* was built in India in 1937/39, and ran on his private continuous track at Barrackpore during 1941/45, when the town was an important 14th Army HQ.

The East India SME came into being there to meet the needs of homesick model engineers in the Services, and men stationed locally and on leave from all over India frequently had *Maisie* in steam. There must be many of them who will read this, and be glad to know that their old sweetheart is still going strong and would be glad (along with her owner) to renew acquaintance.

Rebuilt by service men of the EISME in 1944, she has not been touched since. Her boiler never has been repaired, but steams as well as ever.

Another Barrackpore-built engine is the SR Schools class *Rydal*, completed by Glover in 1944. Does Sergeant Fred Cotton, he wonders,

remember teaching him how they handled narrow sloping firegrates at Nine Elms? This engine is to the designs of H. P. Jackson of York.

The third engine is a Halton tank adapted to look like one of the Baltic tanks of the Indian State Railways, to remind Glover of happy days in India. She is not yet complete but will have all the usual "trimmings" of the ISR including a working turbo-generator, now in hand.

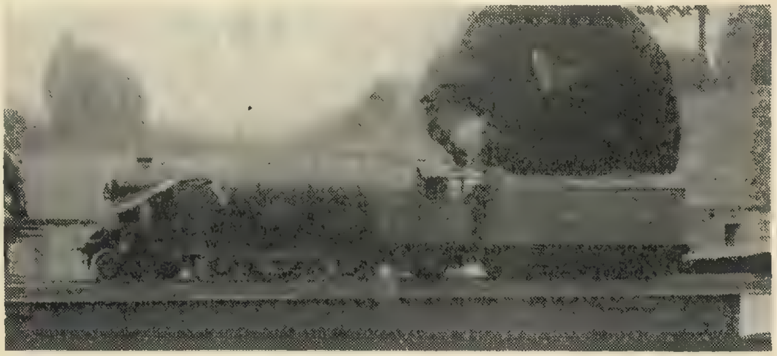
P. H. (Pip) Ruffle is an old stalwart of the club, and his 3½ in. gauge GN Pacific *Royal Lancer* was completed almost twenty years ago, after five years' work. Since then, she has run many hundreds of miles and hauled thousands of passengers, thus proving her worth—and she looks good too!

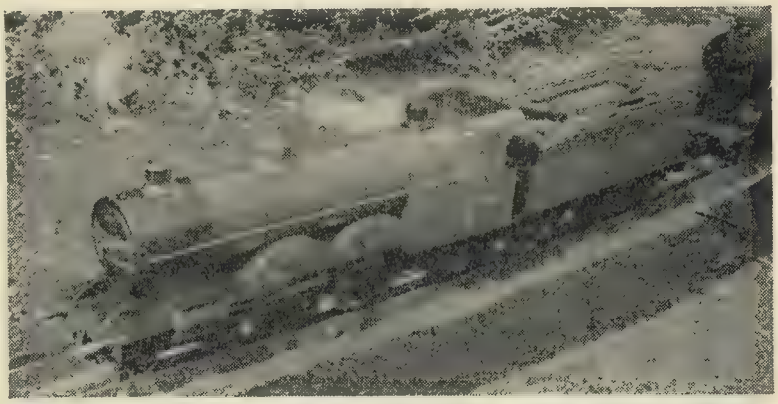
Managing dirictor of Myford's, Mr C. Moore, is not only a vice-president of the club but a really active member too, though much of the engine he was running on this occasion was not his own work. The chassis was a prize-winner at a Birmingham exhibition, and the boiler had been built by D. E. Lawrence, of Bournemouth. A class 94 0-6-0 GWR tank engine, she raised steam very quickly and put up a good show on the track.

Another fine engine was the LBSC-designed *Pamela* in 3½ in. gauge by R. J. Davison. Building entirely to the words and music, the latter kept up with LBSC's schedule in ME, and the locomotive has been running for about three years. She steams well and gives an excellent account of herself on the track.

Rainhill is another popular LBSC design, and A. H. Dakin had brought his well-finished example along. A prize-winner at the 1948 Nottingham Exhibition, she had taken eight months to build in 1947. She too ran very well, hauling driver and passenger with no trouble.

This must, indeed, have been a proud and happy day for society president J. G. Rolinson and acting-president A. J. Witty, both founder members of the club, and for all the others who have worked hard to achieve this excellent track. ■





Top: *D. J. Lawrence drives C. Moore's GWR tank, the latter a passenger*

Second from top: *Pip Ruffle with* ROYAL LANCER, *adorned with a banner*

Second from bottom: *Many ex-servicemen who served in India will know this engine—T. B. Glover's* MAISIE

Myford's managing director, Mr C. Moore, with his GWR tank engine

MPB REGATTAS

By MERIDIAN

MPBA RADIO CONTROL

THE programme of the MPBA Radio Control Regatta, held recently at Brockwell Park, SE, consisted of a steering contest followed by the main event—the much-discussed race for the Taplin Challenge Trophy.

In spite of the strenuous efforts of South London club members who had spent much of the previous day in clearing weed, some of the boats were finishing their runs with propellers festooned with vegetation. An additional sweep with wire netting during the lunch interval helped matters considerably for boats competing in the main event.

Although there are large numbers of radio control exponents among the clubs, these people seem reluctant to take part in competitions. Nevertheless, nine different clubs were represented at the regatta and the total entry reflected a fair percentage of the interest in this branch of model power boats.

The steering course was a fairly simple one, set to suit the Brockwell Park lake, and most of the entries made very good attempts. Points were deducted for hitting buoys, excessive wandering, etc. Extra points could be gained, within the time limit of five minutes, by passing back and forth through the starting gate markers.

The winning competitor, G. Caird, managed to gain four points by this method, thus just beating the entry of W. Warne by one point only.

Mention should be made of the fine effort of C. LeMaitre (Victoria), who achieved third place with a boat fitted only with escapement rudder control.

The course for the Taplin Speed Trophy event was a simple rectangle and each boat had to do two laps giving a total distance of 300 yards. Actually, the distance covered was really somewhat more than this since most competitors took the buoys fairly wide.

The first competitor was S. Stevens (Bromley) with his boat *Lillena* and the course was completed at an average speed of 8 m.p.h.

No one could better this performance until near the end when G. Caird made a very fine run with *BOAC*51—a boat well known to regatta fans and model engineers. This put the speed up a bit and ensured a win for this competitor, who had already won the steering.

This type of event for radio controlled boats seems to have great possibilities. It was certainly exciting to watch, and providing that power plants and power/weight ratio are kept within reason there is little likelihood of unfortunate incidents. On this occasion there were 11 entries for this race—all boats capable of a fair turn of speed.

It appears that the radio control of this type of boat will present great difficulty on any ordinary size lake if speeds of more than 12-15 m.p.h. are contemplated. A boat with good engine control could be slowed down to take the buoys and opened out on the straights—just as in full-size racing. This may well be the line of development if and when boats solely designed for this type of event make their appearance.

Two of the entries were electrically propelled craft using Venner silver/

S. Roger starting RUMPUS 8

Competitors in the radio control regatta tuning up transmitters and receivers

Below: *J. Stevens'* (*Bromley*) LILLENA *under way in the radio control steering competition*

Right: *J. King* (*Welling*) *marshalling the competitors for the first radio control event*

zinc batteries and capable of a performance equal to many i.c. engined craft by virtue of discharge rates of anything up to 400 watts. These were by Messrs Gascoigne and Warne (Elettra). This method of propulsion obviously has great possibilities but at a rather heavy cost in outlay for the batteries.

SOUTHEND

An example of the good relations between the Southend MPBC and the local council was very evident on the occasion of the annual MPBA regatta held on the lake in Southchurch Park. A section of the lake bottom had been concreted for the benefit of competitors starting their boats—an enormous improvement from the former experiences of waders getting stuck in the mud!

This water is a fast one for hydroplanes, although the salt water does deter some competitors—not without good reason, for aluminium parts can suffer from severe erosion if a dive occurs.

Colin Stanworth (Bournville) is now running a new C-restricted boat *Spur*, and the local record was broken easily when a speed of over 67 m.p.h. was announced. At the end of this fine run *Spur* capsized, due to airlift, and upon being retrieved the engine was hastily washed with fresh water in order to forestall trouble from the effects of this immersion.

Another competitor to suffer was N. Hodges (Victoria). Releasing a new boat on a slightly slack line resulted in a capsize which caused some internal damage to the engine—mainly to the con-rod and crank-pin. Such are the hazards of speed-boat racing!

Large numbers of straight runners contested the steering and nomination events, the Victoria club being very strongly represented, as indeed, were several other London clubs. Forest Gate members won both events—R. Fisk the steering, and A. Clark the nomination.

G. Caird's BOAC tender arrested at the end of a trial run

RESULTS OF MPBA RADIO CONTROL

Steering Course Event
1. G. Caird (Bromley), *BOAC51*, 26 points.
2. W. Warne (Elettra), *Amazon*, 25 points.
3. C. LeMaitre (Victoria), *Sea Commander*, 23 points.

Taplin Challenge Trophy
1. G. Caird (Bromley), *BOAC51*, 74 sec. (about 9 m.p.h.).
2. S. Stevens (Bromley), *Lillena*, 79 sec.
3. B. Cook (Victoria), 81.4 sec.

RESULTS AT SOUTHEND

Steering Competition
1. R. Fisk (F. Gate), *Empire Orwell*, 10 points.
2. A. Rayman (Blackheath), *Yvette*, 8 points.
3. J. King (Welling), 6 points.

Nomination
1. A. Clark (F. Gate), *Vivienne*, 0.36 per cent error.
2. R. Fisk (F. Gate), *Empire Orwell*, 0.46 per cent error.
3. B. Cousins (Welling), 4.5 per cent error.

Mixed Hydroplane Race
1. C. Stanworth (Bournville), *Spur* (CR), 67.28 m.p.h.
2. J. Benson (Blackheath), *Orthon* 2 (A), 59.8 m.p.h.
3. S. Poyser (Victoria), (B), 47.57 m.p.h.
4. S. Poyser (Victoria), *Rumpus* 7 (CR), 44.46 m.p.h.

THE WORKSHOP SHAPING MACHINE

DUPLEX concludes his article on this useful machine for the workshop

Fig. 31: *Two tools for machining V-slides*

MACHINING V-SLIDES

When machining undercut V-slides in the shaping machine to the usual angle of 60 deg., the tool used for this purpose can be ground to any of the shapes illustrated in Figs 31 and 32 to form a cutting angle of about 50 deg. so as to clear both faces of the V. In the latter illustration the tool is shown being compared with a 60 deg. threading gauge.

Before machining, the ram slide should be adjusted to eliminate all lateral float; otherwise, when machining the two faces of the slide at the same setting they will not be formed parallel and much hand scraping may be needed to make the necessary correction.

To prevent the tool fouling the work on the return stroke, either the clapper box should be set over towards the work face at a greater angle than the tool slide or the clapper box can be locked, in the way previously described, to keep the tool from rising and damaging the work.

With a reliable power-driven shaping machine, even when using the Drummond hand shaper, it has been found that the only hand scraping usually required consists in smoothing the abutment surfaces until an application of marking paste shows that even contact has been established between the V-surfaces and also the flat contact surfaces of the slide. In commercial practice, hardened and ground steel reference gauges are generally used during the scraping operation, so that when all the mating surfaces have been scraped in to the gauge they will, if parallel, make even contact with one another.

For this work a scraper of the form illustrated in Fig. 34 is required to enable the undercut surfaces of the work to be reached. These tools are usually made in the workshop by softening and forging to shape a discarded, smooth file which, after being rehardened and tempered to a light straw colour, is ground flat and finally honed at the tip to form sharp, smooth cutting edges.

However, it is preferable to machine the slides accurately in the first instance rather than to rely on a somewhat difficult, major scraping operation. What must be avoided is any attempt to fit the slides by applying an abrasive and rubbing them together.

SQUARING THE SPINDLE ENDS

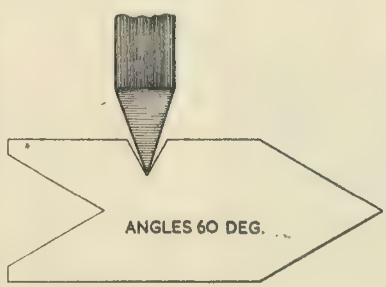
This operation is usually carried out in the milling machine and sometimes by means of a milling attachment in the lathe where the former machine is not available; but no difficulty should be experienced in doing work of this kind in the shaping machine with the aid of simple, additional equipment.

In Fig. 35 is shown a typical machine spindle with a squared end to take a box key or to provide a seating for a shaft fitting. It will be noticed that the corners of the squared portion are rounded and not left sharp; this is both for the sake of appearance and to provide a better fit for the corresponding key.

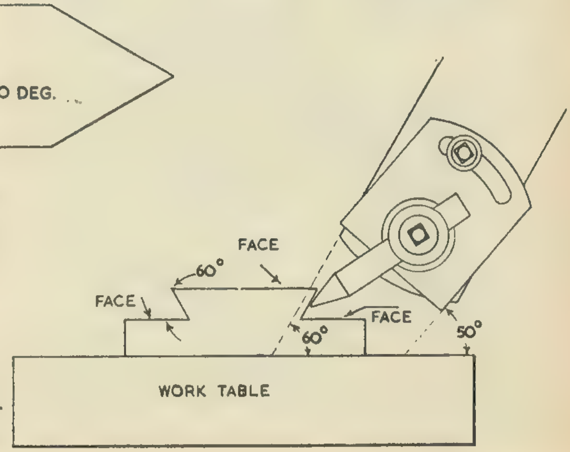
Where the end of a $\frac{1}{2}$ in. dia. spindle is machined to fit a box key measuring $\frac{5}{16}$ in. across the flats, the overall diameter of the work is reduced to 0.44 in. to form four sharp corners after machining. To round the corners, as represented in the drawing, the diameter of the work is reduced by approximately 1/32 in. to read 0.41 in. on the micrometer before the four flats are machined.

It then follows that each of the four flats is formed by reducing the diameter of the spindle by an amount equal to half the difference between 0.41 in. and 0.312 in., which may be taken as 0.05 in. to provide a working fit for the spanner. The diagram, Fig. 36, shows the dimensions for machining the end of a spindle to form a square 1 in. across the flats.

At *A* the squared end is finished with sharp corners when the shaft is turned to 1.41 in. dia. and at *B* the diameter of the work is shown reduced to 1.33 in. to round the corners of the square. To form the flats, metal to a depth of 0.165 in. is removed on all four sides as repre-



Above, Fig. 32: *How to check the tool clearances, using a threading gauge*



Right, Fig. 33: *The clapper box tilted to obtain tool relief on the back stroke*

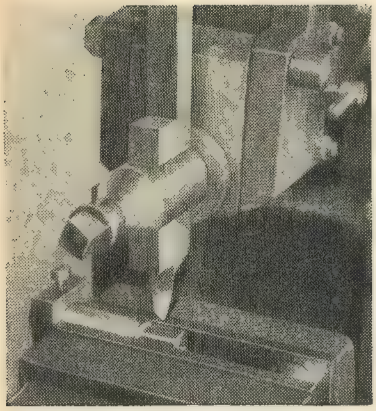


Fig. 37: *Squaring the end of a shaft in the shaping machine*

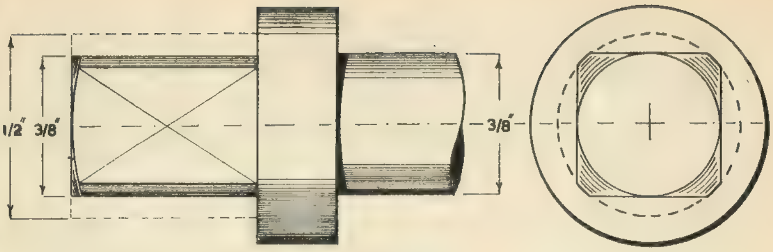


Fig. 35: *A machine spindle with a squared end*

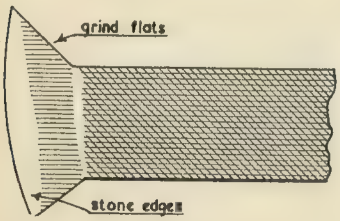


Fig. 34: *A form of scraper for finishing V-slides*

sented at *C*. The length of the squared portion for work of this size is usually made 1⅜ in. as at *D*. All these ratios hold good when scaled down for machining squares of small size.

For machining the flats on the prepared work the spindle is set up in the shaping machine vice in the way shown in Fig. 37.

A V-pointed tool with a small flat stoned at the tip is used for this operation so as to form an angular shoulder at the base of each flat. To make the squared spindle a good fit in the box key the flats must be accurately indexed to 90 deg. This can be readily done by securing to the tail of the spindle a setting gauge of the kind illustrated in Fig. 38.

The square gauge need have only two of its sides formed to an exact right angle, so that for machining the four flats these two sides are aligned in succession by means of a square resting on the machine table. The gauge seen on the right of Fig. 38 was used for machining two diametrically-opposed keyways in a drilling machine spindle and, for this purpose, the side opposite the clamping screw served for indexing the keyways to 180 deg. by rotating and then re-aligning the work in the vice.

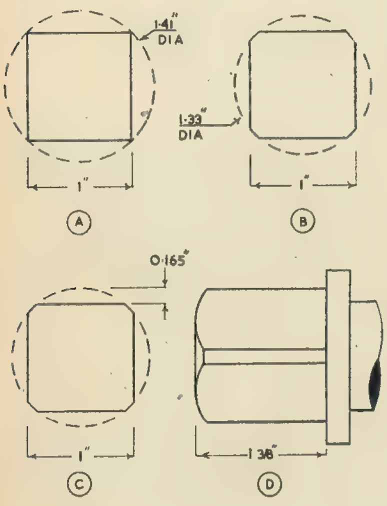
It should be noted that even with a multi-sided gauge there is no need for the shaft hole to be drilled centrally.

A brass 2 BA screw should be used for clamping the gauge in place so as to avoid damaging the work and, to prevent any possibility of the gauge shifting during machining, it is advisable to file a flat seating for the screw in a place where it will be afterwards machined away.

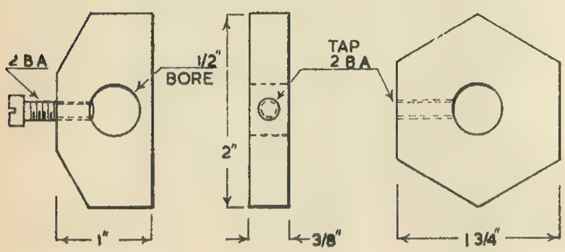
The use of a single-sided gauge of the pattern illustrated in Fig. 39 is preferable when indexing to 180 deg.; for if the two opposite sides of a gauge are employed for this purpose it is essential that they should be exactly parallel. When the spindle of a vertical milling machine was indexed in the way described it was found that the two machined keyways were accurately spaced, so that the corresponding driving pulley could be readily mated with the spindle in either of two positions 180 deg. apart, in spite of the keys having been made a very close sliding fit.

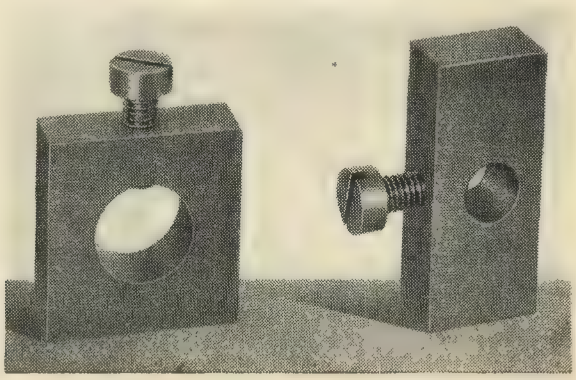
The setting gauge on the right of Fig. 39 is used for indexing work in the shaping machine to angles of 60 deg. and 120 deg.

In a future article it is hoped to give a description of cutting gear wheels and racks in the shaping machine. ■



Left, Fig. 36: *Showing the machining dimensions for forming a* 1 *in. square. Below, left*, Fig. 39: *Showing the dimensions of single-sided and six-sided setting gauges. Below, right*, Fig. 38: *Two gauges for indexing the work*





POSTBAG

The Editor welcomes letters for these columns, but they must be brief. Photographs are invited which illustrate points of interest raised by the writer

TURNRICE PLOUGH

SIR,—In reply to Mr Eastes' letter [Postbag, August 22] in which he criticises the point of fixing of the chain link of my model, I had not seen a Sussex plough for more than fifty years when I decided to make it.

I went to the Science Museum to refresh my memory and I found there a foreign contraption called a Kent plough, and the chain link was, as Mr Eastes says, at the base of the handles. In this detail my memory may be at fault.

I hear now that on a farm back home, one of these ploughs is stored as a curio. If that is so I hope to get a photograph which may prove that we are both correct.

But why, Mr Eastes, must that drag chain be adjustable? The depth of ploughing is determined by raising or lowering the blocks supporting the beam in the wheel standard. A finer adjustment is achieved by the lighter chain on top of the beam varying the angle of the standard relative to the beam.

Welwyn Garden City, Herts. ARTHUR FORD.

USE OF TRACK

SIR,—With reference to the letter from Mr R. Knee, of Welwyn Garden City, Herts, asking for assistance in steaming his mill engine [Postbag, 22 August 1957] I would like to offer him the co-operation of the Hatfield and District SME situated within three miles of his home.

We have a suitable vertical boiler nearing completion, which could quickly be made available to steam his engine, and if he would care to get in touch with me, I would be pleased to introduce him to the society, the members of which are almost entirely steam enthusiasts.

Our meetings are held every Thursday at 7.30 p.m.

57 Lockley Crescent, Hatfield, Herts. F. W. DUNHAM (Hon. Sec.).

VACUUM WELDING

SIR,—Mr E. F. Gough, of Birmingham [Postbag, August 22] suggests the use of a vacuum cleaner as a source of air supply for use with a gas torch. May I offer a word of warning to other likely friends contemplating the use of such?

The fact that the cylinder type of cleaner does provide a fairly high pressure blast of air does not indicate that this is intended to be used for any purpose. All cleaner motors are usually short rated machines, and use is made of the incidental air blast as a cooling medium for the motor; any restriction of this air flow will mean one of two things, either a hot motor or, more likely, a burnt-out one, especially if the air blast is restricted for any length of time.

Some of the cheaper machines do run at a very high temperature after a short while; but this is all right so long as the air flow is not affected in any way.

Enfield, Middx. J. W. COOPER.

DIVIDING APPARATUS

SIR,—Your contributor J. Nixon in his article "Streamlining Little John" [ME, August 8] states that some sort of dividing apparatus is required in order to mark off 125 divisions, following this with a complicated description of how to get a result "not 100 per cent perfect."

I seem to remember another contribution recently making the same point in an article. In point of fact, according to Ian Bradley in his book *Lathe Devices*, the setting-up is quite simple and straightforward.

I enclose a diagram of the set-up.

Westcliff, Essex. F. WOOD.

The simple set-up for dividing apparatus described by Mr F. Wood

SOLVED HIS PROBLEM

SIR,—Some time ago I wrote concerning a query with regard to the wiring connections of a magslip motor. You were good enough to reply to my query and to direct my attention to some back numbers of ME. Thanks to your advice, and to information contained in an article by Duplex, I was able to connect the motor and make it run.

The magslip I had obtained was obviously of the 50 v. 50 cycle variety. I had no transformer which would provide the required voltage but I knew that I could get hold of three more of these motors at a very ridiculous price. With an eye to the future I bought three more and in order to test them connected all four in series using mains a.c. 240 v., 50 cycles supply. The result was that all four motors ran sweetly without any sign of overheating.

The next stage was the manufacture of a small milling spindle for use on the cross slide of the lathe. The spindle was made from a cycle front wheel spindle (this idea was culled from back numbers of ME!) and driven by means of a pulley and sewing machine V-belt direct from the magslip. No gearing was used and the spindle ran at the same speed as the magslip.

The other three were put in a safe place so that, when the spindle was in use, they could idle without harm coming to them. I found that this set up would drill $\frac{1}{8}$ in. holes in mild steel stock without trouble or overheating.

Plans are in hand to construct a more robust type of spindle incorporating ball and thrust races together with stepped pulleys to obtain a greater measure of speed control. A suitable transformer of the auto type is contemplated as there can be no doubt that a lot of power is being lost in the linking together of the motors.

I was surprised to see in the issue of August 1 (page 175) that my query had reached a sympathetic reader, Mr Jack F. J. Stead, in far away Durban, South Africa. I should like to thank him for his interest in my problem and to tell him how the difficulty was resolved.

Truly, Mr Editor, through the pages of ME the world becomes a very small place, indeed. Helping hands are to be found in quite unexpected places.

Portsmouth, Hants. GEORGE A. FLETCHER.

TUTORS NEEDED

SIR,—It appears that there is a considerable shortage of persons able and qualified to teach model engineering in the LCC evening institutes. I

myself have recently had the names of six approved instructors sent to me by the council, none of whom are available and no further instructors are on the council's panel.

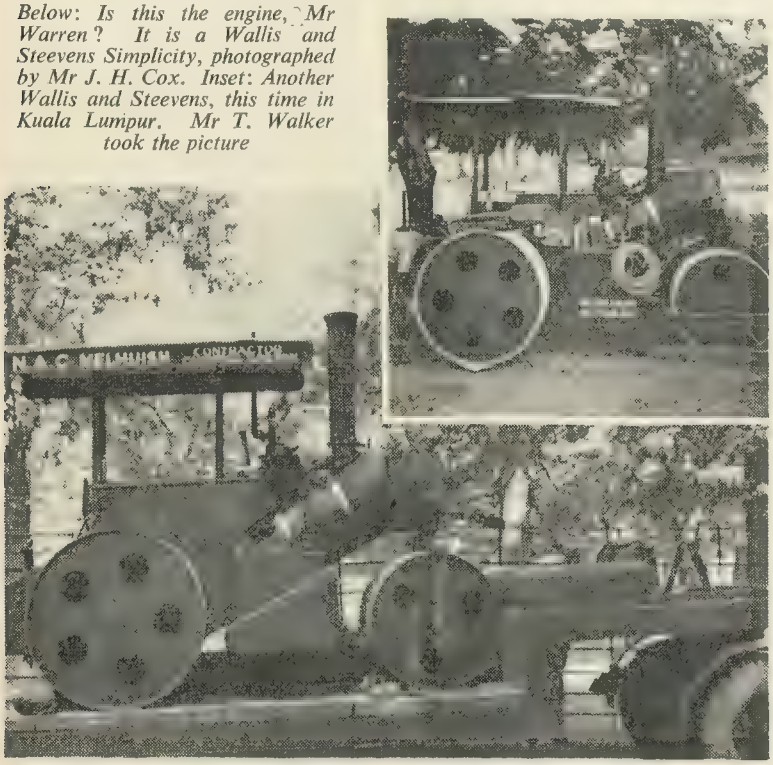
It occurs to me that there must be some among your more mature readers who could be considered qualified and probably quite ready to take up the fascinating and remunerative work of imparting their skill and knowledge to keen youngsters in the junior evening institutes.

I would be grateful to be put in touch with such enthusiasts and offer one of them a vacancy for two evenings a week in my own institute. I should also be glad to pass on to them the procedure for application for appointment to the LCC panel of instructors.

For your information the scale of fees paid in junior institutes is 30s. per two-hour session.

J. S. CLIFTON.

Below: Is this the engine, Mr Warren? It is a Wallis and Steevens Simplicity, photographed by Mr J. H. Cox. Inset: Another Wallis and Steevens, this time in Kuala Lumpur. Mr T. Walker took the picture



A "STEAMEATER"

SIR,—I am much obliged to those who have identified my small two-cylinder tar-sprayer engine. Mr R. M. Woolley confirms my suspicion that the engine will be a "steameater," which lends force to my plea that a further attempt should be made to evolve an efficient small power steam engine which shall be at the same time a practical constructional proposition. Within recent years several designs have been put forward but they do not appear to have caught on—certainly not with any commerical supplier.

Penrith, Cumberland. HAROLD A. ILLINGWORTH.

ENGINE QUERY

SIR,—Mr B. W. Warren's letter interests me as I think the small steam road roller was a Wallis and Steevens Simplicity roller. I am enclosing a photograph of one of their engines taken at the Woburn Park Traction Rally this year.

The engine number is unknown, but it was built in 1928-30. Registered No is OT 8512 and it is owned by Mr N. Melhuish, of Chipping Norton, Oxon.

Chippenham, Wilts. J. H. COX.

SIR,—With regard to Mr B. W. Warren's query [Postbag, August 22], I enclose a photograph of a Wallis and Steevens steam roller similar to the one he describes.

The engine was standing at the end of one of the platforms on Kuala Lumpur station, Malaya. Apart from taking the photograph, I did not have time to obtain any information, except to notice that it was a twin cylinder machine.

Breaston, Derby. T. WALKER.

SIR,—I have seen the engine at Fifield for a very long time, and I feel sure it is an original one of several that used to be shedded there together with other road and agricultural steam tractors.

It is, I am sure, a ploughing engine with drum underneath the boiler. I have seen these ploughing on the Cotswolds quite a lot in the early 1920s. The owner then was Griffen, Agricultural Contractor, Bruern Grange, Fifield.

The other small steam roller with inclined boiler belongs to N. Melhuish, public works contractor, of Chipping Norton, Oxon, who is a very keen rally enthusiast. This one I saw recently at Woburn Abbey rally, and last week at Chipping Norton. He could give Mr Warren minute details of both the engines in question.

Longlevens, Glos. H. A. SIMPSON.

OH, NO, MR NOLAN

SIR,—One of the models in the non-flying aircraft section at the ME Exhibition has irritated me considerably, and doubtless others like me, by the description applied to it. I am referring to the Spitfire model by Roger Nolan, of Luton. Why, oh, why, must some people attach the American classification Pursuit to British fighter aircraft?

Secondly, what mark of Spitfire was this model supposed to represent? If a Mk II, then why the cannon guns, which no Mk II carried? If, as according to the catalogue, it was a Mk II, then where does the armament come from at all, as the Mk II was a photographic reconnaissance version, and carried *no* armament whatever?

On top of all this, why does Mr Nolan claim this as one of the last Spitfires to fly, when the mark numbers continued to Mk XXII.

It may interest Mr Nolan to know that both a Mk V and a Mk VIII Spitfire flew at the Coventry Air Display on July 13, apart from numerous other specimens in various parts of the world, which are still in service.

Dagenham, Essex. STANLEY H. MURDOCK.

A ship modeller's diary

By JASON

SEPTEMBER sees the last of the models homeward bound from the Model Engineer Exhibition. Also, it sees the beginning of the winter work of our hobby. Most important, it also brings a series of discussions and inquests up and down the country. Why? I think the answer to this is very simple.

The Model Engineer Exhibition attracts the best work in the country. Moreover, any model, no matter what standard of craftsmanship has been attained, is eligible for exhibition. Year after year it is suggested that there should be a standard fixed, a limit of eligibility, as it were, for models. I am against this for several reasons. Most important of all is the fact that beginners receive encouragement thereby.

I am writing before the Exhibition so am unaware what will be on show this year but remember that last year two models were on show by the same man. This exhibitor is an acknowledged master, Mr D. McNarry. There were nearly a score of years between the early model and the late model. By looking at these two models side by side one could see at a glance the enormous progress made by this man.

Take as another example, Ike Marsh. He has been submitting models for more than 30 years. He has won two Championship Cups. If anything, his speed in modelling is slower now than it was 30 years ago —*but it is a lot better*.

So, take heart, you beginners. The first step is the hardest. Don't expect to find your first model sweeping the board.

Thomas Miller 1667

AN interesting pamphlet has come my way from USA. It is a reprint from *The American Neptune* (April 1957) of *The Complete Modellist* of Thomas Miller. He was a seaman of Great Yarmouth who lived in the early years of the 17th century. He styled himself " seaman and master in the art of raising the model."

Out of the four or five editions originally published over a period of a quarter of a century, few copies can have survived. Those were stirring days, for Thomas Miller must have received his early training in Stuart times, yet the editions run through Commonwealth and later times up to the end of the 17th century. This shows the inherent conservation of seamen.

The pamphlet was first published scarcely 30 years after the first book on sea practices in English by the famous John Smith, which is well known to advanced modellers. Yet modellers should be warned that Thomas Miller was no modeller as we know the term.

The book itself " deals with the method of constructing a rigging plan or drawing, which is termed ' the model ' and supplies tabulated information on the lengths of rigging." Here I quote from the editor of the pamphlet, Mr Vernon D. Tate.

It must be remembered that this was the time when the dockyard model came into vogue. This was really an extension of Thomas Miller's work for the people who had to find the money found it easier to understand a three-dimensional model than a series of drawings and tables. Nevertheless, Thomas Miller's work is of great importance to advanced modellers and students of naval architecture.

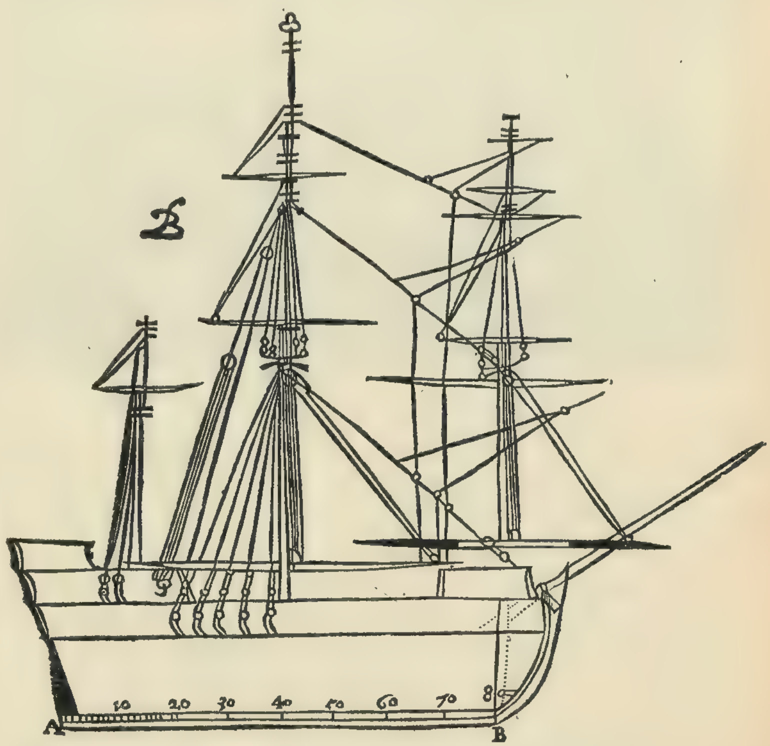
The basis

THE only measurements required by Thomas Miller are (a) the length of keel, (b) the depth of her hold and (c) the breadth of her beam. He assumes decks to be " six and a half feet."

Quite frankly he states "a rule for masting and yarding by proportion but for my part I make no use of it, because it will not hold."

He uses two profiles, one with yards hoisted, the other with the yards lowered. These are both drawn to scale and from these he measures all rigging and gear, both standing and running. Also he does his sail plan from these profiles.

The pamphlet has three drawings and the original has been reproduced in facsimile. ▣



One of three drawings which appear in Thomas Miller's pamphlet

CLUB NEWS

Edited by THE CLUBMAN

NEARLY every community in the British Isles suffers at times from the vandalism of young people who, lacking the creative outlet which they might have found in model engineering or some other worth-while activity, can find no better way of expressing themselves than in pointlessly destroying the work of others. To what extent are the modelling clubs affected by this meanness of mind and spirit ?

I ask because the Sevenoaks and District MES has known the hand of the vandal on its permanent track. Smallness of mind in Greatness Park has, however, failed to prevent the society from flourishing. Indeed, Sevenoaks must be added to the roll of clubs which gather strength from their difficulties.

Membership is small and finances are in consequence extremely limited, but neither of these drawbacks is a serious obstacle where the right spirit exists. When the Sevenoaks society set to building a permanent track, hard work compensated for the shortage in numbers and careful design for the shortage of material—and the result was a railway a seventh of a mile in circumference laid to the single gauge of 3½ in., with the locomotives constructed accordingly.

HARD WORK, HARD THOUGHT

" Members of the club believe," writes treasurer D. N. Chaddock, " that by the judicious use of pre-cast concrete blocks and angle-iron with spaces and no sleepers, it is probably the cheapest and simplest track that has ever been constructed. In spite of this, it has survived two winters and a certain amount of vandalism with little maintenance."

Deservedly, Sevenoaks club has the support of the local council, by whose permission the track is situated in Greatness Park. It was Miss D. Parrot, chairman of Sevenoaks UDC, who declared the track open. Those attending the opening also enjoyed an exhibition in which they saw an Allchin traction engine, model petrol engines and " some weird and wonderful experimental model gas and steam turbines."

Loan wolves in Sevenoaks area may well consider the advantages of joining this lively pack. They should communicate with secretary O. W. Upton at 35 Hillingdon Rise, Sevenoaks, Kent.

ME DIARY

September 19 SMEE annual dinner tomorrow (Friday) at Piccadilly Hotel, London (6.45 for 7.15 p.m.). Arrangements can still be made by notifying S. L. Sheppard (11 Portland Place, W1, Museum 3380, Ext. 106) by noon tomorrow.

September 20 SMEE annual dinner, Piccadilly Hotel.
Rochdale SMEE general meeting, Lea Hall, 7.30 p.m.

September 21 Guildford MES annual exhibition, St Saviour's Hall (by Cattle market), 9.30 a.m.-9.30 p.m.
REC Sallins-Tullow CIE tour (once-a-month line).

September 22 Kingsmere MPBA regatta.
MRCA at Portsmouth (Eastern Road, opposite Golf Course).

September 26 Southport M and EC annual exhibition, Chapel Street Congregational schoolroom (Sept. 26-28).

September 27 North London SME locomotive section, HQ, 8 p.m.

September 28 REC Sallins-Tullow rail-tour ends.
Southport show last day.

September 29 Portsmouth MPBA regatta (Southampton).
Southend MPBC regatta, 2.30 p.m.
Chingford and District MEC at Ridgeway Park.

Model Engineer

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WORKSHOP EQUIPMENT

Buck & Ryan for Lathes and Workshop Accessories, drilling machines, grinders, electric tools, surface plates, etc.—310-312, Euston Road, London, N.W.1. Phone: Euston 4661.

Milling, Grinding, saw table attachments, turrets, or castings. Drill grinding jigs, collets, B.A. screws. List 6d.—G. P. Potts, Yew Grove, Troutbeck, Windermere.

U.S.A. Porter Cable BK 10" Speedmatic portable saw, 1" × 10" blade, 2" × 9" blades, 2" × 9" carb. discs. Strong steel carrying case. Under one hour's use, £25.—Box No. 8618, Model Engineer Offices.

12" Circular Saw Spindle, dustproof ballbearings, pulley, flanges, unused, 62s. 6d. C.P.—Box No. 8619, Model Engineer Offices.

Guildford, deceased member's 6" Atlas complete, snip, £90. Enquire exhibition stewards this Saturday, 9.30 a.m.-p.m.—F. Botting, G.M.E.S., Hut 6, Woking Road, Guildford.

Wanted. Stand for Stanley ½" electric drill. Also stand for Bridges ½" electric drill.—The Quest, Houghton Conquest, Bedford.

For Sale. 2½" B.G.S.C. E.W. lathe, as new. All standard equipment plus motor, countershaft, chuck, boring table, vertical slide and many other accessories, £25 the lot.—96, Kings Road, London Colney, near St. Albans.

Wanted. Myford ML7, preferably on cabinet stand and with accessories, must be in sound condition. For sale. Oxy-acetylene welding blowpipe, two regulators, new condition, £12. Three 240 volt, d.c. motors, £1 each. 1⅓ h.p., a.c., 240 volt Brook motor new, £12. 15 4" × 5/16" × 1" new H.S. milling cutters, £1 each.—Peacock, East Tuddenham, Dereham, Norfolk. Tel.: Honingham 279.

Wanted. Small bench type power shaper. Details to—Taylor, Holly Bank, Yatton, Somerset.

Drummond Treadle Lathe Stand for sale or exchange Myford accessories. Also 11 No. 1 taper H.S. drills ⅛"-17/32".—Robinson, "Milstar," Mill Cross, Denmead.

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Carpenter's Bench, heavy timber, 10' × 3', wood vice, bargain, £5.—Balfour, 42, Kingley's Road, N.W.6. Tel.: Hil 9430.

Lathe 5" I.X.L. B.G.S.C. heavy treadle stand complete, change wheels, faceplate, chuck, £75. Shaper 7" stroke heavy metal stand, hand or power, £20. Both excellent condition.—Malden 3741, evenings.

Burnerd 4" s.c. chuck (model 30) with key, spare jaws, unused, £5 10s. G. Adams 4" round bed s.c. lathe, excellent condition, but no equipment, £10. 3" × 14" lathe, B.G.S.C., less tailstock and slide, £5.—Box No. 8638, Model Engineer Offices.

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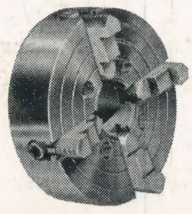

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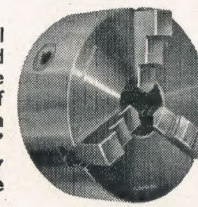

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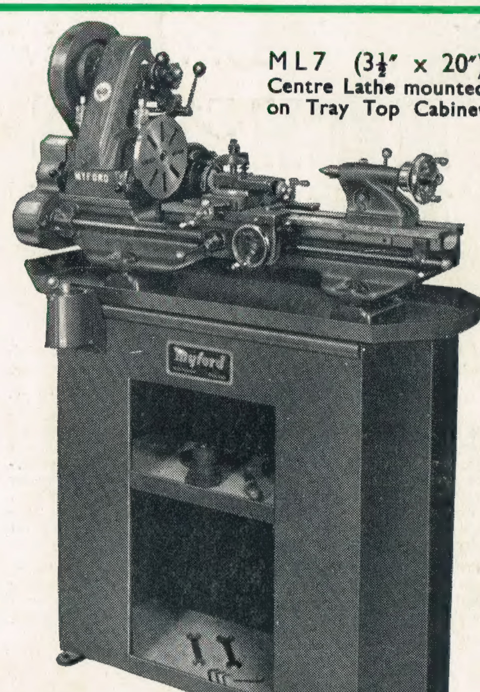

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